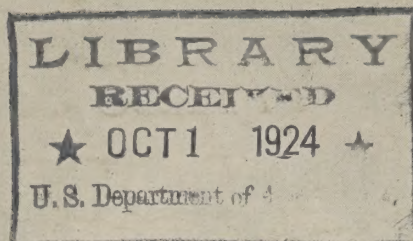


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1924

1924



Yates Book of

FODDER & GRAZING CROPS

D. N. Sheemaker

SEP 23 1924



FODDER AND GRAZING CROPS

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TERMS AND CONDITIONS OF SALE**PRICES—**

We do not print Prices in this Descriptive Catalogue as values fluctuate, and some of our supplies have not been received into store at time of going to press.

All charges are as set out in our Current Price List of Farm Seeds at time of booking order unless specially quoted otherwise.

The Price List now current is sent you herewith, and later issues will be posted promptly on receipt of enquiry.

DELIVERY—

We deliver Seeds on rail or wharf Sydney after which Seeds are on customer's account and at his risk. Orders sent by goods train are consigned carriage forward (except to unattached platforms), unless we are otherwise instructed at time of order.

Delivery within the Suburban area of Sydney will be made of Farm Seeds, Seed Potatoes, Manures, and Garden Sundries at the following charges:— 6d. for 14lbs., 9d. for 28lbs., 1/- for 56lbs., 2/- per cwt.

FORWARDING INSTRUCTIONS—

Please give full and careful directions with each order and we will do our utmost to comply with them. **When no instructions are received we send according to our judgment.**

POST TOWN and SIGNATURE—

Be sure your order bears these particulars before posting. Where postal address is different to address to which goods are to be forwarded please give both.

REMITTANCES—

Orders should be accompanied by remittance for the approximate value of goods, and freight to be included when order is to be sent by coastal steamer, passenger train or by rail to unattended platforms.

Remittances should be sent by Money Order, Postal Notes or Cheque (on country cheques please add exchange).

Our terms for Agricultural Seeds are strictly Nett Cash. Grass and Fodder Seeds (except Seed Grain) are invoiced at net weights and bags charged for. This is to buyer's advantage.

CORRESPONDENCE—

We are always pleased to advise customers and assist them with any information at our disposal, but we ask that letters of enquiry be as concise as possible, and that they be written separately from orders to avoid possible confusion and delay.

CONDITIONS OF SALE**And Non-Warranty**

We believe that all Seeds, Bulbs, and Roots sold by us are of the description and kind specified by us at the time of sale; but owing to the practical impossibility in many cases of being certain of this, we give no undertaking that such Seeds, Bulbs, or Roots will correspond with the description under which they are sold, and we make all sales subject to this condition. We further give no warranty, expressed or implied, as to their growth, description, quality or productiveness, and will not be in any way responsible for the crop. If the purchaser does not accept the goods sold to him on these terms, they are at once to be returned to us, and any money paid to us will be refunded.

ARTHUR YATES & CO. LTD.,

SUPPLIERS OF RE-CLEANED AND TESTED FARM SEEDS

184-186 SUSSEX STREET, SYDNEY, N.S.W.

LETTERS—G.P.O. BOX 2707

TELEGRAMS—"SEEDSMAN, SYDNEY."

A Live Question

“WE should ascertain what is being done by the units of the industry and to increase the production of each cow and of each acre. This must become a very live question in all the dairying centres where such matters as herd testing, conservation of fodder and the manuring of grass lands, are of the greatest importance.”

These words uttered at a recent conference held in connection with the farming industry are evidence that it is the considered opinion of leading men that increased output will enable farmers and graziers to solve the problems presented by the higher producing costs, and, in some cases, the lower product values now ruling.

Apart from herd testing and stock management increased production depends on the following main factors :—

1. Proper tillage of the soil.
2. Rotation of crops.
3. The intelligent and consistent use of fertilisers for crops and pastures.
4. The sowing of the best and highest grade seeds available.

To encourage the more widespread consideration of the principles of better farming, and to give concise and interesting descriptions of the more important seed lines, we have compiled this booklet, which we trust will be of assistance to our customers and lead to more cultivation and a greater variety in the system of cropping.

Why Re-cleaned Seeds?

THE farmer must necessarily obtain the utmost value for his expenditure and many will doubtless ask this question when quoted a few pence more per bushel or per lb. for Re-cleaned and Tested Samples than the price at which "ordinary" seed is obtained.

Consideration will show that the principles of plant breeding and animal breeding are practically identical, and that with plants as with stock it is necessary to seek out superior individuals, prove the productive quality of their progeny and utilize the highest yielding strains for general seed production. This done it is then indispensable with plant life to thoroughly grade and clean the product and to eliminate the shrivelled and weakly seeds, the broken seeds, weed seeds and foreign matter thus using for the next generation only the matured well-filled seed of the right type, and as far as possible free of impurities of all kinds.

Naturally the production and distribution of seed of this high-grade entails rather more expense than is necessary with ordinary samples, but the small extra cost per acre is as nothing compared with the undoubted benefits obtained from the consistent use of the best seeds obtainable.

The following extract from "Agricultural Botany" by Professor John Percival, a recognised British authority on Agriculture, will be of interest in this connection :—

"Few things required by the farmer are of greater importance than good seed, and yet it is not uncommon to find little attention paid to its selection and purchase. Bad seed leads to disappointment in many ways, besides the deficient crop which often results from its use; it is frequently the indirect cause of trouble in introducing weeds, which overrun the crop and leave the ground in a foul condition; parasitic plants are also often present, and these are

accountable for many of the diseases of farm crops. The expense of preparation of the land is the same, whether good or bad seed is used, and the cultivation and management of the crop, whether large or small, is nearly the same; it is therefore important that the best seed obtainable should be sown, as the difference in primary cost between this and seed which is doubtful, is small compared with the difference in the final results obtained from using them. The difference between the very best seed and inferior samples often amounts to little more than a shilling or two per acre, but the use of the latter may often make a difference of pounds on the wrong side of the balance sheet at the end of the year.

" 'The best seed obtainable is never too good' is a maxim which should always be uppermost in the mind when sowing is under consideration, and the danger of being penny wise and pound foolish should be avoided. Cheap seed is not necessarily bad, but it *practically* always is so, and the purchase of undoubtedly good seed at a slightly higher price than ordinary rates, is an extra expense which is always repaid in the improved crop obtained. . . . Although the quality of seeds in the market has undergone great improvement during the last twenty years, good seed is still always high in price, and will remain so on account of its comparative scarcity."

Operating, as we do, the finest and largest seed-cleaning plant in Australia, together with a most careful and complete system of seed-testing, we submit, that in their own interests, farmers when comparing prices should ask for samples and compare quality also.

Every line we send out is Re-cleaned and Tested, that is why Yates' Reliable Seeds produce cleaner, heavier, and more certain crops and thus More Fodder and Bigger Cheques.



Ordinary Samples.

Cleanings.

Yates Re-cleaned and Tested Seed.

YATES' FARM CALENDAR

Approximate times for sowing are denoted by

+ for moderately warm climates where Oranges thrive.

* for cool climates, say where English Fruits thrive.

The most suitable times for sowing are very largely influenced by local conditions and seasons, and these and any local experience available should always be taken into consideration.

Farm Seeds	Jan.	Feb.	Mch.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Artichoke, Jerusalem	...	...	...	...	...	+	+	+	...	...	...	...
Barley, Cape & Skinless	+	+	+	+	+	+	+	...	...	...	...	...
Barley, English	...	+	+	+	+	...	...	...	...	...	...	...
Beet, Sugar	...	...	...	...	...	...	...	+	+	+	...	...
Beet, Silver (Field)	...	+	+	+	...	...	+	+	+	+	...	...
Buckwheat	...	...	...	...	...	...	...	+	+	+	...	...
Canary	...	...	*	+	+	...	...	...	...	...	...	...
Carrot (Field)	...	+	+	...	...	...	+	+	+	...	...	...
Cabbage (Cattle)	...	*	*	...	...	...	...	...	...	...	*	...
Chicory	...	+	+	+	...	...	...	+	+	+	...	...
Clover (Sorts)	...	*	+	+	+	...	...	*	...	...	...	...
Couch	...	...	...	...	...	...	+	+	+	+	+	+
Cow Pea	...	...	...	...	...	...	...	...	+	+	+	+
Grasses, Pasture	...	+	+	+	+	...	...	*	...	...	...	...
Kale, Thousand Headed	+	+	+	...	...	...	...	...	...	...	*	...
Kale, Chou Moellier	+	+	+	...	...	...	...	...	...	...	*	...
Linseed (Flax)	...	...	...	...	+	+	+	+	...	...	...	...
Lucerne	...	+	+	+	+	...	+	+	+	...	...	...
Maize, for Grain	...	...	...	...	...	...	...	+	+	+	+	+
Maize, for Fodder	+	+	+	...	...	...	...	+	+	+	+	+
Mangel	...	+	+	...	...	...	...	+	+	+	...	...
Mangel, Half Sugar	...	+	+	...	...	...	...	+	+	+	...	...
Millet, (See Sorghum)	...	...	...	...	...	...	...	...	...	...	...	...
Mustard	...	+	+	+	...	...	+	+	+	...	...	...
Melon, Cattle	...	...	...	...	...	...	...	+	+	+	...	...
Oats, for Fodder	...	*	+	+	+	+	+	+	+	...	...	...
Oats, for Grain & Hay	+	+	+	+	+	+	+	+	+	...	...	...
Paspalum	...	+	+	+	...	...	...	+	+	+	+	+
Peanuts	...	...	...	...	...	...	...	...	+	+	+	...
Peas, Field for Fodder	...	+	+	+	+	+	+	+	+	+	*	...
" " " Soiling	...	+	+	+	+	+	+	+	+	+	*	...

Farm Seeds	Jan.	Feb.	Mch.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Peas, for Garden	...	+	+	+	+	+	+	+	+	+	+	+
" " Market	...	+	+	+	+	+	+	+	+	+	+	+
Pumpkin	...	...	...	...	...	...	...	...	...	+	+	...
Potatoes	...	+	+	+	...	...	+	+	+	+	+	...
Rape	...	+	+	+	+	...	...	+	+	...	...	...
Rye Corn	...	+	+	+	+	...	...	...	...	...	...	...
Rhodes Grass	...	+	+	...	...	...	...	...	...	+	+	+
Sainfoin	...	...	*	*	*	...	...	...	...	...	...	...
Saltbush	...	...	+	+	+	...	+	+	+	...	...	...
Shallots	...	+	+	+	+	...	...	...	...	...	...	...
Sheeps Burnet	...	...	+	+	+	+	...	+	+	...	...	...
Sorghums & Millets—	...	...	...	...	...	...	...	...	...	...	...	...
Saccharatum	...	+	+	+	...	...	...	...	+	+	+	+
Saccaline	...	+	+	+	...	...	...	...	+	+	+	+
Planter's Friend	...	+	+	+	...	...	...	...	+	+	+	+
Early Amber Cane	...	+	+	+	...	...	...	...	+	+	+	+
Millet, Fodder V'ties	+	+	+	...	...	...	...	...	+	+	+	+
Millet, Broom	...	...	...	...	...	...	...	...	+	+	+	...
Grain Sorghums	...	...	...	...	...	...	...	...	+	+	+	+
Sudan Grass	...	...	...	...	...	...	...	...	+	+	+	+
Sunflower	...	...	...	...	...	...	...	...	+	+	+	...
Swede	...	+	+	+	...	...	...	...	...	...	...	*
Tagosaste	...	...	+	+	+	...	...	+	+	+	...	...
Tares	...	...	+	+	+	+	+	+	+	...	...	...
Tobacco	...	...	...	...	...	...	...	+	+	+	...	...
Teosinte	...	...	...	...	...	...	...	...	+	+	+	...
Turnip (Field)	...	+	+	+	+	...	...	...	...	...	...	...
Wallaby Grass	...	...	...	...	...	...	...	...	...	...	...	...
(Danthonia)	...	...	+	+	+	...	...	+	+	+	...	...
Wheat, for Fodder	...	*	+	+	+	...	...	+	+	+	...	...
Wheat, for Grain	...	...	+	+	+	+	+	+	+	+	...	...

BREAKING IN VIRGIN COASTAL COUNTRY TO PASTURE LAND.

PRACTICALLY all our rich coastal dairying country has had to be broken in from heavy timber scrub and undergrowth to its present condition of fertile pasture and agriculture. To aid him in beating the vigorous natural growth of weeds, bracken fern and scrub, the pioneer must have quick growing and prolific grasses. By sowing suitable grasses in the ashes after the first "burn" a thick sward results in a comparatively short time and this effectively stifles the native growth and encourages stock to trample down any young and uncut undergrowth, which otherwise would soon take charge again.

Paspalum Dilatatum and **Rhodes Grass** have been proved to be the most suitable grasses for surface sowing after burning off in the coastal districts. They are both vigorous Summer growing grasses, and while giving of their best in rainy seasons, will also stand the driest spells without dying out. These two grasses are prolific seeders and both have the habit of spreading rapidly. So vigorous is Paspalum, that, until the introduction of Rhodes Grass, no other plant could withstand its encroachment, except clover; but now Rhodes has proved itself of equal vigor and the two grow excellently together. Many farmers sow them together half and half by bulk measure (by weight

say two lbs. of Rhodes and five lbs Paspalum to the acre). The Rhodes usually comes away first and very soon carries good feed.

Every wise farmer will readily recognise the importance of sowing a little **White Clover** with his grass seed on newly burnt country. This clover germinates readily after a good "burn," provided there is a reasonable amount of moisture in the soil, and cohabitates with Paspalum in a remarkable manner. On any old Paspalum pasture where White Clover has been introduced, it can be found growing strongly right through the root tufts of the Paspalum. Besides this peculiar affinity of the two plants, Clover is a most valuable addition to the feeding value of the pasture, and also improves and sweetens the soil. In Winter when Paspalum and Rhodes pastures are more or less dormant, Clover will come through and give a welcome pick to stock.

If bracken fern is cut once and then burnt when dry, and grasses and Clover sown in the ashes, the grasses will quickly get a good hold, and with three more cuttings when the ferns are in vigorous growth, what was a fern covered waste, should be a good pasture land. Do not burn the cut ferns once the grass has been sown. When Paspalum and Rhodes Grass are established, no fern or other scrub growth need trouble the farmer again.

The Development of Grass Lands

[The following is a thoughtful and most instructive article contributed by A. E. V. Richardson (M.A., D.Sc.,) to the "Journal" of the Dept. of Agriculture (Vic.) The development of our pastures (both natural and sown) is in every way worthy of the greater attention now being given to this subject, and we feel confident that our customers in all parts of Australia will read the following pages with much interest, and if this induces some of them to undertake their own experiments, that is sufficient justification for the space given herein.

It must be remembered that the author writes from personal experience as Agricultural Superintendent, and from actual experiments undertaken in various parts of Victoria. The conclusions arrived at are applicable to the districts mentioned; and to other districts, and to N.S.W. and the other States, they apply in a more or less modified form according to the conditions of soil, climate and incidence of rainfall. That it will pay to make experiments is undoubted, especially as the cost and trouble entailed is so small.

When making tests of different grasses and clovers, and of the effect of fertilizers on pastures, always include land from which is possible to shut off the stock, otherwise they will quickly seek out the better grasses or the "sweeter" patches and results are likely to be misleading.—A.Y. & Co. Ltd.]

The natural pastures of Australia are the basis of national income, for they support practically the whole of the sheep and cattle of the country. As wool and live-stock contribute in such a large proportion to the wealth of the country, the study of the principles underlying the successful production of grass is of great importance. Grass is nature's forage, the healthiest and most nutritious food for stock.

Australia's Heritage of Grasses and Fodder Plants.

Australia's native grasses are justly famous for their grazing and their drought-resistant qualities. They are noted for producing the finest and best wool in the world, and for withstanding great extremes of heat and drought. No other plants have proved equal to our own for the drier parts of Australia. Other countries, notably the United States, have imported these plants, and cultivated them extensively in the drier areas. The success of the pastoral industries of Australia are dependent on the native grass pastures, the indigenous salt bushes, and other edible forage plants; therefore it is essential that a close study should be made of these valuable indigenous plants.

Though Australia has a wealth of native grasses and fodder plants, there are relatively few edible leguminous plants, and no indigenous plants of the genus *Trifolium*—the clover family. The clovers and trefoils greatly improve the succulence and the nutritive value of pastures, and materially assist in improving the fertility of the soil because of their capacity to gather nitrogen from the air.

Though the pasture plants of the drier portions of Australia are unrivalled for their grazing and wool-producing value, it is true that in the moister coastal region introduced grasses and fodder plants thrive exceptionally well. While, therefore, we should continue to rely on our native grasses for the great bulk of our pasturage, we should not hesitate to use introduced grasses and clovers and fodder plants in the moister regions of Australia where the soil and climatic conditions are very favourable for their development. The production of grass is worthy of the closest study, and a knowledge of the characteristics of grasses, and the conditions of soil and climate

suitable for the different kinds, and the seeding and management of grass lands, must be recognised as a great help towards success on the land.

Importance of Sown Grasses in Europe.

The necessity for the cultivation of grasses and clovers for pasture purposes is fully appreciated in Old World Agriculture. In the United Kingdom there are, approximately, 48,000,000 acres under crop and grass. Of this area no less than 28,000,000 acres are under permanent pasture grasses. The permanent grass area exceeds the arable area by 8,000,000 acres. Even on arable land no less than 7,000,000 acres are given up to clover and grasses sown in rotation.

In new countries such as Australia, the greater part of the flocks and herds is depastured on the indigenous grasses and edible forage plants, but increasing attention is being given to the cultivation of introduced grasses and clovers, especially in regions of good rainfall. The total area devoted to artificially sown grasses in Australia is as follows:—

AREA UNDER SOWN GRASSES, 1918-19.

	Acres.			
New South Wales	...	...	...	1,438,382
Victoria	...	...	...	1,269,493
Queensland	...	...	...	418,467
South Australia	...	...	...	21,987
West Australia	...	...	...	14,158
Tasmania	...	...	...	666,954
Total	...	...	...	3,830,124

Number of Cultivated Grasses and Clovers.

There are over 5,000 species of grass in the world, and of these approximately 400 species are indigenous to Australia. Of this vast number of species scarcely 1 per cent. has come into cultivation, and of these not more than 20 genera (exclusive of farm crops) are extensively cultivated. The principal cultivated genera are *Lolium* (Rye grasses), *Dactylis* (Cocksfoot), *Festuca* (Fescues), *Phleum* (Timothy), *Poa* (Meadow grass), *Alopecurus* (Foxtail), *Cynurus* (Dogtail), *Bromus* (Prairie), *Paspalum* and *Phalaris*. There are over 200 species of clovers (*Trifolium*), and of these none is indigenous to Australia. Of the clovers only about ten species are extensively cultivated.

Very little has been done to develop varieties of forage grasses, most of those cultivated being identical with the wild forms. There are probably 1,000 varieties of wheat, 500 of maize, but only one variety of cocksfoot or timothy. At the various experiment stations of the world plant breeders are now at work raising varieties of grasses, and it is probable that shortly commercial grasses, *e.g.*, varieties of perennial rye, cocksfoot, timothy, specially adapted to different soils and climates, or suited to special uses, such as hay or pasture, will be available. Work is in progress at the State farms to breed varieties of Wimmera rye grass (*Lolium subulatum*). This grass, as grown in Victoria, has been shown to be exceedingly variable, and a number of distinct types have been isolated.

Economic Value of Pastures.

The great economic feature of pastures is that they provide a method of feeding live-stock at low cost, because of the perennial nature of the grass, and because little labour is required once the pasture is established. But this does not mean that on the farm the sole use of pasture grasses is necessarily the most profitable method of raising feed. A pasture will be profitable where the cost of producing cultivated foodstuffs is unduly high by reason of remoteness from a railway, or on steep land where cultivation would cause it to scour. It must be borne in mind that grass land invariably produces less dry matter per acre than cultivated crops, so that the price of the land determines whether it should be left in grass or devoted to crop production. The wheat-grower can afford to pay from £15 to £20 and even more per acre for Wimmera wheat land, but if such land were used entirely for grazing it might be difficult to earn interest on even £8 per acre. In some parts of Victoria cultivated pastures are essential in reclaiming timbered forest areas, *e.g.*, Beech Forest and Gippsland. Unless grasses are sown immediately after the timber is burnt, bracken fern rapidly takes possession of the land.

Cultivated pastures, in common with native pastures, help to restore the fertility of the soil depleted by more or less continuous cropping. This is particularly true with respect to the restoration of nitrogen and organic matter. But with respect to mineral elements of nutrition, grazing does not add a single pound of mineral nutrients to the soil, though the grazing of pastures may lead to a concentration of mineral nutrients near the surface owing to the action of the deeper rooted grasses in bringing these from the under sub-soil. Hence, under grazing, the soil will increase in organic matter and in nitrogen (if clovers form a portion of the herbage),

but without supplementary supplies in the form of artificial manures, the total stock of mineral nutrients in the soil must diminish. There are certain types of land which are best left in pasture. These are—(a) hilly land subject to erosion, (b) low-lying country subject to flooding, (c) rocky or stony land, (d) swamp land, (e) heavy clay soils that can be tilled only at considerable expense. Even on high-priced land which could be readily tilled the sowing of permanent pastures may be very profitable. Cultivated pastures furnish feed at low cost, are essential in reclaiming certain types of land, and are especially suitable in certain systems as temporary pastures.

Deterioration of Grass Lands.

It is a matter of common observation that many of our native pastures show signs of deterioration. The quality of the herbage has fallen off, and, in many cases, the live-stock show evidences of malnutrition. Instances of this may be seen in every district, but the most striking cases are those in the older settled areas of good rainfall. Natural pastures deteriorate in several ways—

1. Overstocking and injudicious grazing.
2. Continual removal from the soil of the elements of nutrition by the annual crop of wool, lambs, and fat stock without the replacement of these nutritive elements by means of fertilizers. In addition, in the heavier rainfall districts mineral nutrients, *e.g.*, nitrates and lime, are actually leached out of the soil by the heavy rains.

Let us briefly consider these cases.

Overstocking.

By injudicious grazing and overstocking the better and finer grasses tend to disappear, and poorer types of indigenous vegetation and weeds are left in possession of the land. Overstocking is bad enough in normal seasons, but in drought years it leads to disastrous results. In such years the better types of native grasses are eaten or killed out owing to their slow growth and non-seeding habits. These grasses are replaced by such plants as barley grass (*Hordeum murinum*), the useless soft Brome (*Bromus mollis*), barren fescue (*Festuca Bromides*), thistles of various kinds, Cape weed, and plants of low grazing value. The spread of noxious weeds, *e.g.*, St. John's Wort (*Hypericum*) in the North-East, Hoary cress (*Lepidium draba*) in the Werribee and Horsham plains, Stinkwort (*Inula graveolens*) in the Korong Vale district, Lobelia on the Western plains, has lowered the grazing value of many fine pastures, and has in places detrimentally affected land values.

Even in normal times many stock-owners carry stock in such large numbers that the good grasses have no chance to seed, with the result that the better grasses are gradually replaced by introduced or noxious herbage of lower grazing value than the original pasture. It is natural that the grazier should endeavour to carry as large a number of stock as possible, but though he may gain a temporary advantage with heavy stocking, in the long run the financial results must be unsatisfactory, as the grazing value of the pastures will steadily deteriorate. Pastures should neither be overstocked nor grazed in large areas. Comparatively small paddocks compel stock to graze the herbage uniformly, and prevent them eating only the best of the pasture, and, further, by their use pastures may be rested. Drought years will always seriously affect the pastures, but the evil effects of drought may be greatly lessened by the conservation of fodder in good seasons, improvement in the water supply, increase of irrigation areas, provision of greater transport facilities, which would permit of speedy agistment of stock in such years. In favourable years millions of acres in the interior are covered with grass and herbage in such profusion as to be beyond the power of the stock to consume it. Enterprising stock-owners have cut quantities of grass hay, and made silage as a stand-by for droughty years. This method of conserving the surplus, combined with improvement in the water supply and provision of better transport facilities, will greatly minimise the losses of stock and the deterioration of the pastures which follow every severe drought.

Depletion of Soil in Mineral Nutrients.

The continual removal of the elements of nutrition from the soil by annual crops of wool, lambs, and fat stock sold off the farm without replacement of certain mineral nutrients by artificial fertilizers, will reduce the fertility of both rich and poor soils. This condition will be most evident in the older settled districts of the State, and especially in the moister localities, for in these areas the drain on the soil nutrients is more continuous, and the losses by leaching are considerable. The amount of mineral nutrients removed from the land by the annual crops of live-stock is considerable. Of these nutrients the phosphates are of special importance on account of the low phosphate content of Australian soils. We may roughly calculate the extent of the depletion of our soils in this important soil nutrient. For the past 60 years the average sheep population of Victoria has been approximately 11,000,000, and that of the cattle population 1,400,000. The numbers of stock slaughtered in Victoria are not available

for the early years, but a fair average for the past sixty years would probably be 3,000,000 sheep and 280,000 cattle annually. The average amount of phosphoric acid in a sheep carcass is 2½ lbs., and in a cattle carcass 15 lbs. Hence each year the total amount of phosphoric acid removed from the farms by the animals slaughtered would be 5,223 tons. If we add the amount removed by pigs and rabbits, and also the amount removed as milk, cream, cheese, and wool, the total amount would probably exceed 6,000 tons. This amount of phosphoric acid has been removed mainly from the grass lands during the past 60 years. Thus, throughout that period, something like 360,000 tons of phosphoric acid, which is equivalent to 1,800,000 tons of superphosphate, has been annually taken from the soil, and most of this material has been removed from the pasture lands.

As a very small proportion of our grass lands and pastures has received any addition of phosphate in the form of artificial manures, it would appear that to restore the phosphate content of the soil to what it was in 1860, nearly 2,000,000 tons of superphosphate must be added to Victorian pasture lands.

In addition to the removal of mineral nutrients by animals there are losses by leaching from the soil, especially in regions of heavy rainfall. The main nutrients washed from the soil are nitrates and lime. No figures are available as to the extent to which these constituents are removed in Victoria. At Rothamsted, on a rainfall of 28 inches, the losses of carbonate of lime from the soil by leaching have been shown to be no less than 8 cwt per annum. Fortunately, both phosphoric acid and potash are firmly held by the soil, and the losses of these constituents by leaching are negligible.

Improvement of Grass Lands.

Grass lands may be improved in three ways—

- (1) Sowing down with native or introduced grasses.
- (2) Growing a cereal or root crop, and using liberal dressings of fertilizers.
- (3) Top-dressing the pastures with suitable fertilizers, *e.g.*, superphosphate, or with certain soil amendments, *e.g.*, lime or gypsum.

1. SOWING DOWN WITH NATIVE OR INTRODUCED GRASSES.

The first method of improving the pastures is the sowing down of lands with native or introduced grasses.

(1) Native Grasses.

Over the greater part of the Continent the climatic conditions are too severe for the successful sowing of introduced grasses. Only the

native grasses and fodder plants will thrive on the drier areas. The growing of introduced grasses and clovers is only possible in the higher rainfall areas—the coastal region and the highlands. The seeding of native grasses is a difficult and expensive matter on account of the low vitality of the seed, *i.e.*, its low germinating power and the scarcity and high price of the grass seed on the market. The germination of seeds of certain species, *e.g.*, *Danthonia* (the Wallaby grasses) and *Anthisthiria* (Kangaroo grasses) is usually very low, fresh samples of seed often giving germination percentages of only 10-20 per cent. The *Andropogon* (Blue grass) and *Panicum* (the Panic grasses) show higher vitality, as do also the various species of *Astrebula* (Mitchell grasses).

The type of native grass that can be sown to best advantage is dependent mainly on the amount of rainfall and its seasonal incidence.

In the summer rainfall region of Northern Australia the dominant species are the Panic grasses (*Panicum*), Mitchell grasses (*Astrebula*), the Blue grasses (*Andropogon*) and the various species of *Erianthus*.

In the winter rainfall zone of Southern Australia the predominating native grasses are the various species of *Danthonia* (Wallaby grasses), *Agrostis* (the Bent grasses), *Anthisthiria* (Kangaroo grasses), *Stipa* (the Spear grasses), *Eragrostis*, and *Poa*. The various species of *Danthonia* are, perhaps, the most useful of grasses suited to the southern areas. They furnish a great quantity of winter feed, which is highly palatable and nutritious for sheep feed. The Kangaroo grasses are very wide-spread, but are somewhat coarse, and are very common on protected areas, *e.g.*, forest and railway reserves. The Stipas or Spear grasses grow rapidly, and furnish an abundance of sheep feed during the greater part of the year. The seed of several species is very troublesome to sheep because of its pointed nature and its coarse twisted awn, which has remarkable penetrating power. This grass seed is specially detrimental to young lambs, as it may injure the eyes, and certainly penetrates the skin and lowers the value of the carcass. Every effort should be made to market the lambs before the grass seed begins to ripen.

Poa, *Agrostis*, and *Eragrostis* are found in the cooler regions of the State, and provide good feed for stock.

In the drier parts the salt bushes are of considerable importance. These are great drought resisters, and are highly adapted to hot dry localities and soils with high saline content. Of the various genera *Atriplex*, *Kochia*, and *Rhagodia* are of greatest economic importance. Victoria has ten species of *Atriplex*, six of *Kochia*,

and five of *Rhagodia*. One of the most important species of *Atriplex* is *A. Semibaccata*, a spreading, prostrate plant which has been introduced and cultivated in California with considerable success.

It is a curious fact that, while California imports seed of these Australian fodder plants for cultivation on the drier lands, we, in Australia, are indifferent to the cultivation either of these edible forage plants or our very valuable native grasses.

There is no doubt that cultivation would greatly improve the native grasses in succulence and bulk. This may be seen from the excellent growth which they make when cultivated in small grass garden plots. There is little doubt, too, that good seeding habits would follow from systematic cultivation and selection.

A great field of work awaits investigation in the improvement of Australian grasses. The pastoral industry is such a valuable asset that every means should be taken to conserve our native grasses and to aim at improving them in bulk, succulence, seeding capacity, and in stock-carrying capacity.

(2) Introduced Grasses.

In the moister regions of Australia—the coastal areas and the highlands—the growth of introduced grasses offers a sure means of increasing the stock-carrying capacity.

For the areas dependent on summer rains, the summer growing grasses, *e.g.*, *Paspalum*, Rhodes grass (*Chloris*), &c., are extensively used. Both these grasses are extensively grown in New South Wales.

For areas within the winter rain region, *i.e.*, the Southern Coast of Australia and the adjacent highlands, perennial rye grass, cocksfoot, prairie grass, and Kentucky blue grass are the most useful grasses, and white, perennial red, and alsike, the most valuable of the clovers. On rich coastal flats strawberry clover (*T. fragiferum*) is a most valuable clover, and on relatively poor land subterranean clover (*T. subterraneum*) has proved of great value.

For the lighter rainfall areas, Wimmera rye grass (*Lolium subulatum*) is worthy of trial.

The climatic conditions of Victoria are not such as to render the establishment of permanent grass lands an easy problem.

In the preparation of the soil for a crop that is to occupy the land for many years it is sound practice to do the work thoroughly. The wheat-grower now spends as much as fifteen months' work on the preparation of a fine, firm, well consolidated seed bed for a single crop of wheat. The permanent grass crop which will occupy the land for many years should have at least an

equally thorough preparation. The main requirements are a well cleaned, firm, mellow seed bed, in fine tilth and condition. To secure such a seed bed under Victorian conditions, it will be necessary to precede the grass crop either by a well-worked bare fallow, or by a fallow crop, preferably a root crop, which has been liberally manured and frequently intertilled. Either of these would make an excellent preparation for the grass crop.

In the case of wet low-lying areas some form of drainage, either surface or underground, is essential to secure vigorous healthy growth of the pasture.

If the grower of grass could be induced to prepare the land with the same thoroughness as the wheat-grower works his land, a good germination and successful establishment of a pasture would be ensured.

The selection of suitable grasses for a permanent pasture is a difficult problem. The soils and climatic conditions vary very widely in Victoria, and each set of conditions should be experimentally tested before the best mixture can be determined.

Grasses are divided into top or bottom plants, according to the position they occupy in the sward. The tall, strong-growing grasses, *e.g.*, cocksfoot, tall oat grass, are top grasses, while the dwarf varieties, *e.g.*, sheeps' fescue, foxtail, and crested dogstail, form the sole or bottom herbage. For good pasturage top and bottom grasses should be included, though for hay mixtures tall varieties should predominate.

Grass seeds may be sown in spring or autumn, but in most districts the spring months and summer are too dry to insure rapid germination and establishment before the summer sets in. Early autumn sowing will usually give best results. Usually the best results are obtained without a nurse crop, though under certain circumstances the use of a nurse crop may be advisable. In lighter rainfall country the growing of a nurse crop should be dispensed with.

The method of seeding a grass crop is of importance. Whether the seed is sown by broadcasting, by the seed barrow, or by a grass seed attachment to the drill, it is of importance that it be sown as shallow as possible, and, if possible, the seeds should be barely covered. On a fine, well-prepared seed-bed the use of a brush harrow or a very light tined harrow will be sufficient to cover them.

2. IMPROVEMENT OF GRASS LAND THROUGH THE USE OF CEREAL AND ROOT CROPS.

The second method of developing grass lands—feeding the grass through the use of liberal dressings of fertilizers applied to cereals, *e.g.*, wheat (in the north), oats, roots of fodder crops

(in the south)—is practicable over the whole arable area of the State. There are large areas of country in the western parts of the State where the stock-carrying capacity of the land has been greatly increased by ploughing up the virgin sod, sowing an oat or a wheat crop with a liberal dressing of superphosphate, and allowing the land to revert again to pasture. The herbage has greatly increased both in quantity and quality as a result of this treatment, and the stock-carrying capacity of the land has been increased. On many of the large sheep stations on the Western plains this practice has been found to be most advantageous.

In the wheat belt there is no question that the stock-carrying capacity of the farm is greatly increased by the use of liberal dressings of superphosphate on the wheat crop. Experience has shown that the use of liberal dressings of superphosphate not only guarantees a full wheat crop, but materially stimulates the stock-carrying capacity of the grass and herbage that follow the wheat. This leads to increased stock-carrying capacity, more sheep being kept on the wheat farm, and this, in turn, assists the farmer to secure higher wheat yields.

For arable areas in a large rainfall country this is undoubtedly the best means of securing an increase in the stock-carrying capacity of the farm.

3. TOP-DRESSING AS A MEANS OF DEVELOPING GRASS LANDS.

This is the most direct method of immediately securing increased returns from our grass lands, and is capable of wide application throughout Victoria. It is in the areas of more liberal rainfall, however, that the effects of top-dressing will be most marked.

There are several reasons for this. The moister regions of the State have been longer settled and more heavily stocked than the lighter rainfall country. Hence the drain on the mineral constituents of the soil has been heavier and more continuous than on the lighter rainfall areas. Moreover, losses by leaching, particularly of nitrogen and lime, have been heavier in these areas.

It is commonly believed that grazing improves the fertility of the soil. It is well to understand precisely what grazing does. Plants gain 95 per cent. of their dry matter from the atmosphere, and only 5 per cent. from the soil. The growing of plants and the decomposition of their residues will cause the soil to become richer in organic matter, but not in mineral nutrients. There may be a transfer of mineral nutrients from the sub-soil to the surface soil, but the zone within which plants feed does not become richer in mineral nutrients. By grazing, a large amount

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of the organic matter in the herbage, and from 50 to 60 per cent. of the mineral matter, is returned to the soil in the fæces of the animals. As the organic matter is obtained by the plants wholly from the atmosphere, it follows that under grazing the soil will increase its content of organic matter. The mineral nutrients, however, must show a decline by the amount removed in the wool, milk, and bodies of the animals. Hence, while the organic matter increases, the total mineral nutrients must show a decline. If these mineral nutrients are replenished and augmented through the medium of artificial fertilizers, then grazing will lead to increased fertility, but not otherwise.

Our soils are notably deficient in phosphate. They are, however, well furnished with potash and other mineral nutrients. Wheat-growers have realised how necessary soluble phosphates are for a wheat crop, and no wheat-grower would now attempt to grow a wheat crop without the use of superphosphate. Grass needs phosphate as much as wheat, and the grower of grass will not secure full value from his pasture without the liberal use of phosphates. Phosphates are of special value to grass lands. They supply an essential mineral plant food which is most likely to be lacking in ordinary soils. Any deficiency in phosphate leads to starved grass, and the stock grazing on phosphate-starved-grass cannot remain profitable to their owners.

Soluble phosphates have a most stimulating influence on the development of the young root system. It gives the wheat and the grass an early start. With wheat crops this early start does much to secure the crop against drought.

Soluble phosphates improve the feeding value of the pastures, and in grazing, stock will always prefer the manured to the unmanured grass land. Phosphates stimulate the growth of leguminous plants, *i.e.*, clovers and trefoils, and thus enable a store of nitrogenous humus to be added to the soil. The effects of top-dressing are most marked over a very large area of Victoria. The experiments conducted by the Department of Agriculture, and by numerous Agricultural Societies under the auspices of the Chamber of Agriculture, afford most convincing evidence of the value of top-dressing as a means of greatly increasing the stock-carrying capacity of the land. Some of the results obtained in these experiments will be detailed below.

Results of Top-dressing Tests.

RUTHERGLEN.

The first experiment was conducted in 1913 to determine the effect of phosphates on the grazing value of the pasture. Four plots each of half an acre in area were marked out on natural pasture land. Plot 1 received a dressing of 2

cwt. of superphosphate; Plot 2 no manure; Plot 3 Basic slag, 2 cwt.; and Plot 4, superphosphate, 2 cwt., and 10 cwt. of lime. These dressings were applied in February. The effect of the manurial applications was very noticeable to the eye, the herbage of the manurial plots being more abundant and of deeper tint than the untreated plot, and contained a much higher proportion of trefoils. In order to test the grazing and fattening value of the grass the same number of uniform quality lambs were placed on each plot on 14th November. Sixty lambs were used in the experiment, each group of fifteen lambs being weighed on and weighed off the plots. The results were as follow:—

TABLE I.—INCREASES IN LIVE WEIGHT OF CROSS-BRED LAMBS ON GRASS LANDS VARIOUSLY TOP-DRESSED (RUTHERGLEN EXPERIMENT FARM, 1913).

Plot	Treatment	Weight on	Weight off	Days on plot	Increase of Live Weight per Plot	Increase of Live Weight per Acre
		lbs.	lbs.		lbs.	lbs.
1	Superphosphate, 1 cwt. 1913	960½	1,206	28	245½	491
2	No Manure	950	1,069	21	119	238
3	Thomas' Phosphate, 2 cwt. 1913 only	952½	1,146	28	193½	387
4	Superphosphate, 2 cwt. 1913 Lime, 10 cwt. 1913	943½	1,192	28	248½	497

Though the winter was relatively dry, the increase in live weight due to the application of superphosphate and superphosphate and lime, was more than double the increase from the unmanured plot.

A series of top-dressing experiments was subsequently carried on four acre plots of native pasture on the Rutherglen farm. The manures were applied in the autumn from 1915 to 1920, and each year each plot was grazed to its full capacity. During 1920 records were made of the yield of dry grass, the average composition of the herbage and the number of sheep grazed per acre throughout the year. The results were as follow:—

TABLE II.—SHOWING WEIGHT OF GRASS HAY, PERCENTAGE OF CLOVERS AND TREFOIL ON FERTILIZED AND UNMANURED NATURAL PASTURES, RUTHERGLEN.

Plot	Yield of Grass Hay	Percentage of Pasture in—			Percentage of Nutrients in Herbage—			Sheep Grazed throughout Year
		Grasses	Clovers	Weeds	Nitrogen	Phos. Acid.	Lime	
	Cwt.	per cent.	per cent.	per cent.	per cent.	per cent.	per cent.	
No manure	23.2	64.7	14.3	21.0	1.46	.27	.60	1.08
1 cwt. super.	43.7	18.0	74.8	7.2	2.28	.59	1.47	1.94
1 cwt. super. + lime 10 cwt.	62.1	21.0	74.8	4.7	2.20	.46	1.44	2.0

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The results of this test demonstrates several facts—

- (1) The great increase in the bulk of herbage brought about by top-dressing with soluble phosphates. The application of 1 cwt. of superphosphate nearly doubled the yield of grass hay. The application of lime in addition increased the yield from 23.2 to 62.1 cwt. of grass hay.
- (2) The most remarkable development was, however, the very large increase in the proportion of trefoils and clovers on the manured pasture. These occupied nearly 75 per cent. by weight of the total herbage.
- (3) As the clovers and trefoils have a higher proportion of nitrogen and potash than grasses, it was to be expected that the average proportion of these nutrients in the composite sample of manured pasture would be higher than that of the unmanured grass. The average phosphate content of the manured pasture was considerably higher than that of the unmanured land.
- (4) The number of stock raised per acre on the top-dressed plots was nearly double that of the manured plots. The stock were much healthier on the manured pasture.

HAMILTON.

During 1920 a field of natural pasture at Hamilton was top-dressed with superphosphate 2 cwt., another with superphosphate 2 cwt. and lime 10 cwt., and a plot of unfertilized grass was left as a control plot. Each year the weight of dry grass was determined on each plot, and a botanical analysis made of the pasture. The results were as follow:—

TABLE III.—SHOWING YIELD OF DRIED GRASS PER ACRE FOLLOWING ONE APPLICATION OF FERTILIZER IN 1920, HAMILTON.

Plot	1920	1921	1922	1923	Aver. for 4 years
	cwt.	cwt.	cwt.	cwt.	cwt.
No manure	8.0	15.3	15.9	21.4	15.1
Super. 2 cwt.	30.4	24.6	22.6	29.5	26.2
Super. 2 cwt. and lime 10 cwt.	35.4	29.3	25.7	31.9	30.5

PERCENTAGE YIELD OF DRIED GRASS FOLLOWING ONE APPLICATION OF FERTILIZER IN 1920.

Plot	1920	1921	1922	1923
	per cent.	per cent.	per cent.	per cent.
No manure	100	100	100	100
Super. 2 cwt.	380	160	142	137
Super. 2 cwt. and 10 cwt. lime	445	191	162	144

The results were very striking. The growth of grass was greatly stimulated during the first

year of the application of the fertilizers, and the weight of dry grass per acre was nearly quadrupled, the most marked result being the plot dressed with superphosphate 2 cwt. and lime 10 cwt.

The season was dry, yet the growth of the grass on all the top-dressed plots was remarkable.

Though no fertilizers were applied since 1920, there was a considerable increase in the weight of herbage on the top-dressed plots each year, and even after four years the increase due to superphosphate, 2 cwt., was 37 per cent. greater than the unmanured plot. It is clear that the effect of the top-dressing is most noticeable the first year, but that even after four years the effect of the manure persists.

Equally striking were the results of the fertilizers on the quality of the pasture. The proportion of grasses, clovers, and weeds in the pasture has been determined for the past three years.

The results were as follow:—

TABLE IV.—SHOWING AVERAGE PERCENTAGE OF GRASSES, CLOVERS, AND WEEDS IN TOP-DRESSED PASTURES, HAMILTON, 1920-23.

	Grasses	Clover.	Miscellaneous Plants
	per cent.	per cent.	per cent.
Nil	78.3	5.7	16.0
2 cwt. super.	66.9	15.2	17.9
2 cwt. super. and 10 cwt. lime	59.8	23.5	16.7

The main difference in the three plots was the increase in the leguminous plants—clovers and trefoils—in the top-dressed sections.

The marked stimulation of the growth of clovers and trefoils by phosphatic dressings is of practical significance. These plants have a high nutritive value on account of the high ratio of digestible protein to carbohydrates as compared with that of grasses and other herbage. A high proportion of leguminous herbage in the pasture is especially desirable where dairy cows are kept, for a cow in full milk requires a pasture with a relatively narrow nutritive ratio, *i.e.*, a high proportion of digestible protein to carbohydrates. Ewes and lambs and young growing stock also thrive best on such a pasture.

Besides the increase in weight of herbage and the improvement in the quality of the herbage, there was a marked improvement in the palatability of the top-dressed sections. In all cases it was found that the stock preferred the herbage on the top-dressed sections to that on the unmanured area.

An interesting example of the preference shown by cows for top-dressed land was recorded by Mr. Horne, of Cudjee. In distributing the phosphate with the drill narrow strips were inadvertently missed. Subsequently the cattle

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were observed to graze down these treated sections, and at the end of the season strips of dry grass on the untreated areas were visible for a considerable distance.

GLENTHOMPSON.

During 1920 the Department of Agriculture laid out a field at Glenthompson to test the effect of top-dressing on poor native pasture land. The fertilizers were applied in 1920, but no dressings have since been applied. The results, like those at Hamilton, show the lasting effect of an initial application of phosphate.

The results for three years are as follows:—

TABLE V.—SHOWING THE YIELD OF DRY GRASS FOLLOWING ONE APPLICATION OF FERTILIZER IN 1920, GLENTHOMPSON.

	1920	1921	1922	Average for three years
	cwt.	cwt.	cwt.	cwt.
No manure	2.55	8.9	10.07	7.17
Super. 2 cwt.	7.03	14.16	19.64	13.61
Super. 2 cwt. and lime 10 cwt. ...	8.4	19.7	26.11	18.07

It is apparent that the beneficial effect of the fertilizers applied in 1920 was still pronounced three years after the application of the phosphate. One peculiarity in this series of plots was the absence of trefoils and clovers on all plots. In all other experiments conducted by the Department and by the Chamber of Agriculture, the increase in the development of the leguminous herbage was a marked feature resulting from the phosphatic dressing. It is probable that on the poor pasture lands of this district, the seeding of trefoils and clover with the application of the fertilizers would prove beneficial. This matter is being tested this season.

Experiments by the Chamber of Agriculture.

A number of top-dressing tests were conducted during 1923 under the auspices of the Chamber of Agriculture. Over 30 of such plots were laid out on a uniform plan—(a) No manure; (b) 1 cwt. superphosphate; (c) 2 cwt. superphosphate per acre. In practically all cases substantial increases were recorded on the plots treated with superphosphate.

The centres recording substantial improvement in the pastures as a result of top-dressings were as follow:—Ararat, Ballarat, Benalla (two centres), Casterton, Camperdown, Heathcote, Korumburra, Kyneton (two centres), Leongatha (two centres), Maffra, Portland, Romsey, Sale, Tallangatta (three centres), Traralgon, Warra-gul (two centres), Warrnambool (two centres), Whittlesea, and Yea. The only centre where top-dressing did not show an increase was Euroa.

The annual rainfall of these centres varies from 18 to 40 inches. No tests were made on the lighter rainfall country, though there is reason

to believe that dressings of water-soluble phosphates would give a profitable response on the natural pastures in the Wimmera and the northern areas. Experiments on private farms in the Wimmera during the past year have shown that substantial improvement in the carrying capacity of the grass land results from top-dressing.

Space will not permit a review of these tests, but reference may be made to that carried out in the Kyneton district, where the results for two years are available. They are of special interest, in view of the fact that each year the plots were cut with a mower, and the grass hay dried and weighed over the municipal weigh-bridge. In this way a fairly accurate estimate of the value of the top-dressing was obtained.

The results were as follows:—

TABLE VI.—SHOWING WEIGHT OF DRY GRASS HAY PER ACRE ON TOP-DRESSED PLOTS, KYNETON, 1922-1923.

Plot.	1922.	1923.	Average for Two Years.
	cwt.	cwt.	cwt.
No Manure	8.0	19.25	13.62
Superphosphate 1 cwt per acre	15.87	27.5	21.68
Superphosphate 2 cwt. per acre	26.0	44.0	35.0

The plots were sown on separate paddocks each year, and the soil was representative of the average land of the district. The rainfall for 1922 was 22.51 inches, and for 1923 30.26 inches. The value of the grass hay—which was sold at £3 per ton—on the unmanured plot averaged for the two years £2 0s. 10d. per acre, while that on the heavily manured plot was worth £5 5s. per acre. This increase was obtained for an expenditure of 12s. per acre, being the cost of the fertilizer and its application.

There was a remarkable growth of clover and trefoil on the manured sections of these plots.

The majority of the farmers who conducted the demonstration tests for the local societies, in co-operation with the Chamber of Agriculture, have displayed a fine public spirit, which is most admirable. In many cases they fenced off the areas on which the experiments were conducted, and made careful records of their progress and secured data on which to base estimates of the yield of grass from each dressing.

Relationship Between Chemical Composition of the Soil and the Character of the Mixed Herbage Growing on the Soil.

A close relationship exists between the chemical composition of the soil and the character of the grass grown on the soil. That the growth and quality of grass is an indicator of the fertility of the soil is well known. The practical man judges the value of land mainly by its capacity to grow grass.

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Our soils, as a whole, are known to be deficient in available phosphoric acid. Moisture supply and soluble phosphates may be regarded as the two most important limiting factors in the growth of crops and grass over the southern portion of the continent.

Kincaid* has shown that Australian grasses have a markedly lower phosphoric acid content than those of Europe, and that acclimatized European grasses have a much higher phosphorus content than native Australian grasses, but lower than the same kinds of grasses grown in Europe. In the same paper it was shown that the wood of Australian trees has a lower phosphate content than that of European trees.

These facts appear to indicate that the low phosphate content of Australian grasses and Australian herbage is a reflex of the environment in which they grow, *i.e.*, the deficiency of phosphate in the soil produces a vegetation which, compared with that of other countries, is low in phosphates.

Phosphoric acid is a most important substance in animal nutrition. In combination with lime and magnesia, it forms 85 per cent. of the ash of bones, and the ash of muscular and nervous tissue contains approximately 35 per cent. of phosphoric acid. All tissues provided for the maintenance of the young are very rich in phosphorus, *e.g.*, eggs, milk.

The experiments of Hart, McCallum, and Fuller (*American Journal of Physiology*, XXIII., 1908-9) showed that animals fed on foods deficient in phosphates soon became abnormal, exhibiting weakness of limbs and debility; whilst if the diet were made normal again the animals gradually recovered. Cattle living on natural foods poor in phosphate of lime often suffer from a form of paralysis.

Soils deficient in phosphates produce grass with a low content of phosphates. Such phosphate-starved grass will inevitably produce phosphate-starved animals which will become unprofitable to their owners. Can this be avoided? If the deficiency of soluble phosphate is made up by the liberal application of water-soluble phosphate, will the grass grown on such soil show increased phosphate content?

On this important point, some very definite evidence is available from the Rothamsted Experiment Station.

One of the most noticeable results of the manuring of permanent grass lands with various artificial manures is to markedly change the proportions of gramineous, leguminous, and miscellaneous herbage in the pasture. Hence, if we desire to test the changes in the chemical com-

position of the herbage as a result of manuring, it is necessary to separate these three types of herbage in the pasture and compare the composition of each on the manured and unmanured plots.

This has been done at Rothamsted. A permanent grass plot of uniform composition was treated with various combinations of fertilizers. The herbage on the manured and unmanured portions was divided into (a) grasses; (b) legumes; (c) weeds; and representative samples of each group were analyzed for total ash content and phosphate content of the ash.

The following table summarizes the results:—

TABLE VII.—SHOWING ASH CONTENT AND PHOSPHATE CONTENT OF THE GRASSES, CLOVERS, AND WEEDS IN A PERMANENT PASTURE ON MANURED AND UNMANURED PLOTS.

Nature of Herbage	Total Mineral Matter		Phosphoric Acid in the Ash.	
	Unmanured	Manured with Phosphates	Unmanured	Manured with Phosphates
	Per cent.	Per cent.	Per cent.	Per cent.
Gramineous, grasses	6.40	6.86	4.79	9.67
Leguminous, clovers	8.07	7.79	4.81	8.59
Miscellaneous weeds	9.24	10.27	3.96	8.02
Mean ...	8.24	8.31	4.52	8.76

The table shows that the application of phosphates does not appreciably affect the average ash content of the mixed herbage, but that it does materially alter the proportion of phosphoric acid in the ash.

The phosphate content of the ash of grasses and weeds is more than doubled by the liberal application of water-soluble phosphate. The phosphate content of the ash of leguminosae is increased by 80 per cent. The average phosphate content of the mixed herbage on the manured plot is 94 per cent. higher than that of the unmanured plot.

Wherever phosphoric acid was applied artificially there was a substantial increase in the phosphate content of the herbage.

From these experiments it is clear that the application of liberal dressings of water-soluble phosphates to the soil brings about a marked increase in the phosphate content of grasses, clovers, or weeds grown on that soil.

Exhaustive investigations at Rothamsted have shown that there is a close relationship between the ultimate chemical composition of the mixed herbage and the supplies at command within the soil. Further, these supplies, to a great extent, determined the type of plants encouraged and the character of their development, and the influence of these induced factors is clearly traceable in the chemical composition of the mixed herbage grown on the soil.

* The Biochemical significance of Phosphorus—Hilda Kincaid. *Proc. Royal Society Victoria* v. 23. p. 368, 1911.

We may, therefore, assume that the application of soluble phosphates to Victorian soils normally deficient in this ingredient, will result in the following advantages:—

- (1) One limiting soil factor controlling the vigorous growth of grass will be removed, and this will enable heavier crops of grass to be grown on the same rainfall.
- (2) The soluble phosphate added to the soil will produce herbage with a much higher content of phosphoric acid.
- (3) The grass thus produced will be better suited to produce vigorous healthy stock than grass from unmanured land. Being richer in phosphates, the grass on the manured land will be especially valuable for ewes in lamb, for dairy cattle, and for young growing stock.

Effect of Phosphates on Crop Growth.

1.—*Phosphates Promote Root Development.*

Lawes showed that the application of superphosphate led to the development of the lateral and fibrous roots of the plant. Watt showed that the application of soluble phosphates to a wheat crop encouraged deep-rooting habits.

Phosphates are particularly valuable wherever greater root-development is required than the soil conditions normally bring about. They are therefore of special value on clay soils, where roots do not naturally form well, and for shallow-rooted crops with a short period of growth, e.g., barley.

As the application of soluble phosphates encourage deep-root development, they are beneficial wherever drought conditions are likely to prevail. Hall has suggested that the marked effect of superphosphate on wheat in the dry regions of Australia may be due to the fact that phosphates induce the young roots to grow rapidly into the moister layers of soil beneath the surface.

2.—*Phosphates Required for Early Development of the Plant.*

The movements of phosphoric acid from one part of the plant to another are remarkable. Phosphoric acid is the most mobile of the inorganic constituents of the plant. Arendt found phosphoric acid in the oat plant continually passing from the lower parts of the plant to the upper parts, especially after flowering.

The upper leaves and stem gave up more than 80 per cent. of the phosphoric acid they had accumulated and sent it into the ears.

Voelcker points out that the seeds of plants contain much phosphoric acid, whilst the soil usually contains very little. By putting phos-

phates in reach of the young plant we simply act upon a hint which has been "given by Nature in the care she takes to provide young plants in their earliest periods of existence with a constituent which possesses such a remarkable effect in pushing the young plant."

There is present in the protoplasm of the vegetable cell, and especially in the nucleus, an albuminoid substance called nuclein, which contains several per cent. of phosphorus, taken either from the phosphates in the original seed or from the phosphates in the soil. Phosphates are required for cell-division, and therefore for the vigorous growth of the plant. Thus, Lawes found that fat and albumen accumulated in the absence of phosphates, but that as soon as a trace of potassium phosphate was added, energetic cell-division took place.

Phosphates are also required for the transformation of the starch, formed as a result of photosynthesis, into sugars. Thus, Reed showed that starch was formed in the absence of phosphorus, but that it did not change to sugars.

We are therefore justified in assuming that, as Nature is so very careful in furnishing the embryo with an abundance of phosphates stored up in the seed, and since phosphates are so essential for energetic cell-division and for the transformation of starch into sugar, the presence of soluble phosphates in the soil during the early stages of the young crop is essential to vigorous growth and active development of the crop in its early stages.

3.—*Phosphates Hasten the Maturity of the Crop.*

Phosphates promote the early maturity of the crop. This may be seen in a striking manner on the Permanent Fertilizer plots at the State Farms. The plots liberally dressed with soluble phosphates turn colour from ten to twelve days before the unmanured plots. In dry seasons this earliness of maturity is of decided advantage to the crop.

The beet-grower often takes advantage of this characteristic of superphosphate. Since ripe beets contain more sugar than unripe beets, one consequence of early maturity is that the sugar manufacturer can obtain a highly saccharine juice at an earlier stage from fertilized beets. In the beet areas of Europe it has been customary to apply heavy dressings of phosphates to those fields from which the crop is to be harvested early.

The saying amongst beet-growers that "phosphates make sugar" is explained by the earlier ripening habit of the fertilized beets.

4.—*Phosphates Increase the Phosphate Content of Grass.*

It has been demonstrated above that one marked result of the application of soluble phos-

phates to grass land is that it greatly increases the phosphate content of the herbage. At Rothamsted it was shown that the phosphate content of the herbage was nearly doubled where liberal dressings of phosphate were applied. As our soils and our natural herbage are notably deficient in phosphates, this is a fact of fundamental importance.

5.—*Phosphates Economize Water Supply of the Soil.*

One important effect of soluble phosphates is to materially lower the Transpiration Ratio. This has been demonstrated by the writer, who showed that with wheat the Transpiration Ratio on unmanured controls was 377 for dry matter and 1,355 for grain. Where a normal dressing of nitrogen, phosphoric acid, and potash was applied the Transpiration Ratios were reduced to 292 for dry matter and 1,216 for grain. With excess dressings of the same plant nutrients the Transpiration Ratios were reduced to 270 and 871 for dry matter and grain respectively. In other words, the unmanured controls gave a 29 per cent. higher water requirement than the normal dressing and 39.6 per cent. higher water requirement than the heavy dressing.*

Fertilizers applied to soils either naturally poor or deficient in any nutrient not only greatly stimulated the yield, but appreciably lowered the water requirement both for dry matter and grain.

The addition of liberal dressings of soluble phosphates to a crop already well supplied with available nitrogen (as in well-worked fallows) not only increases the vigour and size of the crop, but lowers the Transpiration Ratio and brings about a more effective use of the limited supplies of soil moisture. This is a matter of vital importance in a region of limited rainfall.

6.—*Phosphates Increase the Bulk, Succulence, and Palatability of Herbage on Grass Land.*

This has been abundantly demonstrated by the results of the various experimental plots described above. These experiments have shown that the bulk of herbage has in many cases been more than doubled by the application of phosphates, that the proportion of clovers and trefoils has been greatly increased, and that the palatability and nutritive value of the pasture has been increased. Stock have shown a decided preference for the top-dressed grass, and chemical analyses of the herbage from top-dressed land showed it to be markedly superior to that of the non-fertilized area.

Fertilizers Used for Top-dressing Pastures.

Considerable stress has been laid on the importance of phosphates, because it has been shown experimentally that soluble phosphates may be

applied with profit and advantage over the whole of the heavier rainfall country of Victoria. In localities with a heavy spring rainfall nitrates may be found advantageous as a supplementary dressing to phosphates, and on certain soils, *e.g.*, peaty and sandy soils, even potash salts may be found necessary.

Lime, either in the form of carbonate, *e.g.*, ground limestone or slaked lime (agricultural lime), may be required in regions of heavy rainfall and where the soil has developed an acid reaction.

Gypsum may be found useful on soils overlying stiff subsoils, but in these cases the improvement will be due to an amelioration of the texture of the subsoil.

PHOSPHATIC FERTILIZERS.

Phosphatic fertilizers may be applied in three forms—

- (a) Water soluble phosphate—*e.g.*, superphosphate.
- (b) Citrate soluble phosphate—*e.g.*, basic phosphate.
- (c) Insoluble phosphate—*e.g.*, bone dust, rock phosphate.

Superphosphate is the most effective of the phosphatic fertilizers for top-dressing. The Department of Agriculture has tried superphosphate, basic phosphate, rock phosphate, and basic slag in top-dressing tests, but in all cases superphosphate has given the best results. The phosphoric acid in this fertilizer is almost wholly soluble in water and its action on pastures is immediate. It supplies phosphoric acid in a form in which it can be immediately used by the crop, and the effect of its application is noticeable in the increased vigour and growth of the young grass. It is known that superphosphate undergoes gradual reversion when applied to the soil—*i.e.*, it gradually changes from water soluble form to a less soluble form. This being so, one might naturally ask wherein lies the superiority of superphosphate and why should he bother to convert rock phosphate into a water soluble form if the phosphate in the superphosphate begins to revert when it is applied to the soil. The probable explanation is that the phosphate in superphosphate, immediately it is applied to moist soil, becomes dissolved in the soil water and assumes a condition infinitely more minute than could ever be obtained by any process of mechanical grinding. In this fine state of division it becomes intimately diffused through the surface layer of soil and becomes gradually reverted on the colloidal or other fine particles of the soil. This extreme state of subdivision, combined with its intimate diffusion through the soil, makes it superior in its action to citrate-soluble or citrate-insoluble phosphate. Wherever

* Cf. Water Requirements of Farm Crops. A. E. V. Richardson, Department of Agriculture, Victoria.

the minute root hairs go in search of phosphate in the soil treated with superphosphate small quantities of very finely divided phosphate in a more or less assimilable form are to be found coating the finer soil particles.

Superphosphate has demonstrated its efficacy on pasture lands through a strip of country extending from Portland to Bairnsdale and from Tallangatta to Goroke. Throughout the wheat belt no fertilizer has given such satisfactory results as superphosphate.

BASIC PHOSPHATE AND BASIC SLAG.

While the phosphoric acid in these fertilizers is not as soluble as that in superphosphate, it is far more soluble than the phosphoric acid in bones and mineral phosphates. These two phosphates contain a certain amount of free lime, and in sour soils, and in regions of heavy rainfall, they may be useful in correcting soil acidity and furnishing phosphate in a reasonably soluble form. The phosphate is not soluble in water, but dissolves in weak acids and in water containing carbonic acid, and therefore gradually comes into solution in the soil. The finer the basic slag is ground the more readily does the phosphate become available.

Basic slag has given remarkable results in clay grass-lands of Europe, its action being to encourage the growth of white clover in the pasture which so increases the nitrogenous organic matter of the soil that greater growth of grass becomes possible. These fertilizers are most effective on heavy clays and sour soils deficient in lime.

GROUND ROCK PHOSPHATE.

Ground rock phosphate applied in the form of a fine powder has been used in parts of the United States. Beneficial results have been obtained on sour land and on peaty soils, especially when the material was very finely ground.

NITROGENOUS FERTILIZERS.

Nitrogenous manures are not usually profitable in Victoria. In Europe, however, they are very important. The limiting soil factor for crop growth in Britain is usually the amount of available nitrogen in the soil, but in Australia the quantity of available phosphate sets the limit for crop growth.

Under European conditions, the heavy rainfall causes extensive losses of nitrates from the soil by leaching, the intensive system of cropping in vogue leads to rapid depletion of nitrates, and nitrification does not usually proceed actively on account of the relatively low soil temperatures.

In Australia the losses by leaching are slight,

the soils have not been under cultivation for a great length of time, the system of cropping is extensive, and nitrification has been shown to proceed most actively in our soils. For these reasons, the application of nitrogenous manures is usually unprofitable in the areas of lighter rainfall. In the high rainfall areas and the hill country, a limited call for nitrogenous manures exists.

Nitrate of soda and sulphate of ammonia are likely to be most useful fertilizers to supply this need. Both manures are very soluble in water. The relative merits (apart from price per unit of nitrogen) of nitrate of soda and sulphate of ammonia depend largely on the nature of the season during which they are used. In wet seasons the sulphate of ammonia is rather more favourable than nitrate of soda, and is less likely to be lost from the soil; but in normal seasons nitrate of soda is probably the more valuable fertilizer.

Potassic fertilizers are not likely to be required, except on peaty soils and on light sandy soils. Loamy soils and clay soils usually contain adequate amounts of potash.

LIME AND GROUND LIMESTONE.

These substances may be useful in heavy rainfall country on "sour" soils. They supply the soil with a base which neutralizes any acidity or sourness of the soil, and they markedly improve the physical condition of the soil. The change in the physical condition is brought about by carbonate of lime going into solution in soil water containing carbonic acid gas in solution. The bicarbonate of lime so formed causes the flocculation of the very fine particles of colloidal clay, and the soil is thus made more open and porous.

It is obvious that the action of lime, ground limestone, or chalk on the texture of the soil must necessarily be slow, because the ameliorating effect of these substances begins when they are dissolve by the carbonated water in the soil. These substances are usually applied to improve the soil texture, and correct sourness of acidity in the soil, rather than to supply the soil with plant food. They are, therefore, used in relatively heavy dressings, *e.g.*, from 10 cwt. to 20 cwt. per acre; and infrequently, *i.e.*, every four or five years. Over a considerable area of Victoria, lime or limestone does not give a material response. On country with a heavy rainfall, *e.g.*, over 30 inches, considerable quantities of carbonate of lime are leached from the soils, which are naturally low in lime content, and in these areas the application of ground limestone or agricultural lime will be beneficial.

DEVELOPMENT OF GRASS LANDS.

Time of Application of Artificial Manures.

The time at which the manures are applied depends upon the type of fertilizer and the climatic conditions of the locality.

Phosphates are best applied when growth of grass commences. For southern Australia, this corresponds with the autumn. If applied in the autumn, root development is favoured, early growth is stimulated, and the grass makes good headway before the cold of winter. It is held by some that there is a danger of losing a good deal of the phosphatic fertilizers, especially a water-soluble phosphate like superphosphate by spreading it in autumn and allowing it to receive the full force of the heavy winter rains. There is little in this theory, and need be no anxiety regarding the fate of the soluble phosphate.

Water-soluble phosphate is rapidly fixed by the finely divided colloidal matter of the soil within a few inches of the surface.

This fixation of phosphates is of great practical importance. Carbonate of lime, compounds of iron and alumina, are able to arrest any water-soluble phosphate that may be applied to the soil. Though nitrates are regularly found in drainage waters, especially from soils heavily dressed with nitrates or ammonium salts, phosphoric acid is rarely found in the drainage waters.

Voelcker filtered barnyard liquor through loams of various kinds, and found that practically all the phosphoric acid in the liquid was speedily fixed by a moderate quantity of soil, even when the latter was poor in lime.

Dyer was able to show by analyses of the soil from the manured and unmanured plots at Rothamsted, that the heavy dressings of superphosphates added annually during a period of 70 years did not penetrate the subsoil. He found that the difference between the phosphate content in the soil of the two sets of plots was approximately equal to the total quantity of phosphoric acid which had been applied to the soil during the 70 years, minus the difference in the calculated quantity removed by the overhead portion of the crops from the two plots.

Soluble phosphates are easily fixed by the soil, and prevented from being washed into the subsoil or into the drainage waters. Superphosphate may therefore be applied early in autumn without risk of any loss. As it gives such a decided stimulus to root-growth, and plays such an important part in the nutrition of the crop in the early stages, it might well be applied with the first autumn rains.

Potash, like phosphoric acid, is firmly fixed by the soil. Potassic manures may therefore be ap-

plied with safety early in autumn.

On the other hand, the soil is unable to hold nitrates. These are readily washed out of the soil by heavy rains. Fertilizers, such as nitrate of soda, are therefore best applied in early spring as a top-dressing. Ammonia is more or less firmly held by the soil. In wet localities, and in wet seasons, sulphate of ammonia is to be preferred to nitrate of soda. Lime and ground limestone are usually applied as a soil ameliorant. They act by becoming dissolved in carbonated water to form bi-carbonate of lime, which speedily flocculates the fine colloidal clay particles.

The efficacy of the carbonate of lime depends on the rate at which it dissolves in carbonated water. Hence it should be applied early in autumn, so that the full solvent action of the winter rains may be obtained.

RATE AND FREQUENCY OF APPLICATION.

The rate at which fertilizers may be applied to grass lands depends largely on the amount of rainfall and the nature of the soil. In regions of heavy rainfall, where heavier and more continuous production of grass is possible, liberal dressings should be used. Similarly, while poor land will show a greater relative response to fertilizers than rich land, the rich land can better bear the cost of heavier applications than light land.

Much work is necessary to determine the quantity of various fertilizers required for grass land in the different climatic regions of the State. It may be said, however, that the recent experiments of the Department and of the Chamber of Agriculture show that at least 1 cwt. of superphosphate should be applied, and that in many cases an initial application of 2 cwt. is advisable. The actual amount should be determined on each farm by sowing a few trial plots. Where lime or ground limestone is required, it should be applied at the rate of from 10 to 20 cwt. per acre. One application usually lasts for several years.

With regard to the frequency of application, it has been shown that the effects of one application of phosphate persists for at least four years, but the greatest improvement is observed the same year as the phosphate is applied.

After the initial application of superphosphate, dressings of, say, 1 cwt. per acre may be repeated every two or three years. This is a matter that each farmer must work out for himself on a strict financial basis. There is no reason why the grass crops should not be treated in the same way as a wheat or hay crop, i.e.,

given a dressing each year of an amount of phosphate at least equal to that removed by a normal crop.

Nitrates or sulphate of ammonia are usually sown at a lesser rate than phosphates. From 40 to 60 lb. of these fertilizers per acre usually suffices, but they should be used as a supplement to phosphates; not as a substitute for them. They are best applied as a top-dressing in early spring in regions of heavy rainfall. They do not persist in the soil like phosphates, so that wherever nitrogen is found to be lacking annual dressings of these fertilizers will be necessary.

METHOD OF APPLICATION.

The fertilizers may be applied with a seed-drill, or a fertilizer distributor, or they may be broadcasted. For grass lands, the fertilizer distributor is a convenient method of applying the fertilizer. It covers a strip of from 9 to 10 feet wide and requires but one horse. It will sow small quantities, *e.g.*, from 1 to 2 cwt., and if required, larger quantities up to 1 to 2 tons. It is, therefore, useful both for spreading artificial manures and also for spreading lime, gypsum, or ground limestone.

The harrowing of the pasture before the application of the fertilizer is advisable.

APPLICATION OF RESULTS TO VICTORIA.

The results of the top-dressing tests recorded above have a wide application to Victoria. Most of the lands in the heavier rainfall country are deficient in available phosphates. They have long been settled and heavily stocked, and the drain on the mineral nutrients partly by leaching, but mainly by removal of nutrients through the annual crops of wool, lambs, and fat stock has been considerable. No wheat-grower would now think of seeding his crop without soluble phosphate, nor should the grass-grower expect to raise good nutritious grass without the application of phosphates. Our soils are low in available phosphates, and they have been made poorer by several generations of improvident stock husbandry.

The welfare of Victoria depends largely on the number of stock that can be kept in the good rainfall country. The number can be greatly increased—certainly doubled, and possibly trebled—by concentrating attention on the development and improvement of the grass lands of the State. By the adoption of rational cultural practices, the use of suitable grasses and clovers, and the application of soluble phosphates the stock-carrying capacity of his pastures may be greatly augmented, and the health of the stock much improved.

We need to recognise the vast importance of the grass crop to the State, and to treat the grass in a rational manner. The results obtained in the experiments conducted by the Department of Agriculture and the Agricultural Societies suggest a means whereby every farmer may bring about a material improvement in the carrying capacity of his farm.

Through the use of soluble phosphates, combined with improved cultural methods, a remarkable transformation has been effected in the wheat belt of Northern Victoria. With the aid of soluble phosphates, the use of suitable grasses and clovers, and the rational treatment of grass lands, an even more remarkable change may be effected in the 30,000,000 acres of pasture land in this State, which will result in a great increase in the numbers of stock carried, and a material improvement in the fertility of the soil.

Summary.

1. Australian grasses are noted for their grazing qualities and for their capacity to withstand great extremes of heat and drought. The native plants should be made to furnish the bulk of our pasturage in the drier areas. In the moister areas, introduced grasses and clovers should be freely used.

2. Nearly 4,000,000 acres of land are devoted to artificially-sown grasses in Australia. Victoria has 1,300,000 acres of sown grasses.

3. Cultivated pastures furnish feed at low cost, require very little labour when once established, and are essential in reclaiming certain types of land.

4. Grass lands deteriorate mainly by (1) overstocking; (2) removal of mineral nutrients by leaching, and by losses through live stock.

5. The better types of native grasses are killed out by overstocking, owing to their slow growth and non-seeding habits. Introduced plants of low grazing value readily supplant the native grasses.

6. A fruitful cause of deterioration is the removal of the mineral nutrients by the annual drafts of live stock products sold off the farm. It is estimated that during the past 60 years 360,000 tons of phosphoric acid, equivalent to 1,800,000 tons of superphosphate, have been removed from the grass lands of the State.

7. Grass lands may be improved in three ways:

- (a) Sowing down with native or introduced grasses.
- (b) The use of liberal dressings of fertilizer with root and cereal crops.
- (c) By top-dressing natural or sown pastures.

8. The seeding of native grasses is expensive on account of scarcity and high price of seed, and the low vitality of seed. The sowing down of introduced grasses and clovers is recommended for the moister districts and the highlands. The type and mixture recommended depends on the character and amount of rainfall, and the fertility of the soil.

9. The improvement of grass through the liberal fertilization of cereals and root crops may be practised over the whole arable area of the State. It is specially valuable in the wheat areas. The liberal use of fertilizers gives a full crop and a good residuum for stimulating the grass on the stubbles.

10. Top-dressing is a sure means of improving grass land. The response is most marked in regions of heavy rainfall, where there is more leaching, and on those lands that have been longer settled, and those which have undergone heavier and more continuous grazing.

11. Experimental work has clearly demonstrated that for Victoria soluble phosphates are the most valuable fertilizers for top-dressing.

12. The stock-carrying capacity of land at Rutherglen has been doubled by the application of moderate quantities of soluble phosphates.

13. At Hamilton and Glenthompson, the bulk of grass on plots treated with superphosphate was treble that of the unmanured plot, and the effects of the phosphate were noticeable at least three years after its application.

14. A close relationship exists between the chemical composition of the soil and the composition of the mixed herbage growing on the soil. Soils deficient in phosphates produce grass with a low phosphate content. Phosphate-starved grass produces phosphate-starved stock. The application of liberal dressings of phosphate to

the soil results in a great increase in the phosphate content of the grass, and an improvement in the health and vigour of stock.

15. Phosphates promote root-development and early growth, and hasten maturity. They lower the transpiration ratio, and thus lead to economical use of the water supply of the soil. They increase the bulk, succulence, nutritive value, and palatability of the pastures. The addition of soluble phosphates removes the important limiting soil factor for heavy production.

16. Superphosphate is the most profitable form in which the deficient phosphate supply may be made good. For the greater portion of Victoria, it is the only fertilizer required at present to stimulate pasture growth. Basic phosphate and basic slag stand next in value to superphosphate, and may be useful on sour lands and in peaty soils.

17. There is a limited call for nitrogenous fertilisers, but only in regions of heavy rainfall, where leaching is excessive, and where nitrification proceeds slowly.

18. Carbonate of lime and agricultural lime may be required on heavy rainfall country to correct sourness in the soil and improve the texture of stiff clays.

19. Phosphates should be applied with the first autumn rains. They are not likely to be lost from the soil even by the heaviest rains. As soluble nitrogenous fertilizers are readily washed out of the soil, they should be applied as a top-dressing in early spring. Lime is best applied early in autumn.

20. Grass is Australia's greatest crop, and a study of the principles underlying its successful production is of great national importance.

VALUABLE NATIVE GRASSES

OWING to seasonal and economic conditions it has been impossible to ensure regular supplies of more than one or two of our splendid native grasses. This will probably be gradually remedied with the growing realization that in her native grasses and plants Australia possesses perhaps her greatest asset.

Those interested should write for particulars of varieties available.

Farmers and graziers saving seeds in commercial quantities of any of the above are invited to communicate with us and send samples. There are several other Australian grasses of considerable merit, but seed is rarely in the market.



Coolah Grass and Native Millet at our Trial Grounds.

WALLABY GRASS

(*Danthonia*)

One of the hardiest of our native grasses. Grows in a wide variety of soils and climates. Especially adapted to the poorer soils unsuited to other grasses, splendid for sheep.

Mr. F. Turner in his work, "Australian Grasses," says of this variety.—"It grows both in the coastal districts and in the arid interior; it is one of the most nutritious grasses of Australia, and, unlike most other species of this genus, it will grow more or less all the year round. Stock of all descriptions are remarkably fond of it. The seed germinates readily after showery weather in the autumn and spring months. On good soils the roots of this grass penetrate to a great depth, which enables the plant when growing in the arid interior to withstand long spells of dry weather." The seed is very light, and a small quantity will cover a good breadth of land; we would strongly recommend that two to three pounds per acre should be added to all mixtures for any soil or climate, or up to fifteen pounds per acre alone.

MITCHELL GRASS

(*Astrebula*)

This is one of the best native grasses we have, and will yield a large amount of succulent herbage, of which stock are very fond. This grass is very nutritious, a good drought resister, and forms a permanent pasture. Requires well-drained land. Quickly responds to rainfall. If cut when it first shows the flower stem, makes excellent hay. Seed is only saved in favorable seasons and we usually offer both *Astrebula triticoides* and *Astrebula elymoides*. Sow two to three pounds per acre.

AUSTRALIAN BLUE GRASS

(*Andropogon sericeus*)

This perennial grass grows well in the coastal districts and colder portions of New South Wales, Victoria and Queensland but it is also found in other parts. It is a valuable pasture grass, and, in suitable situations, makes considerable growth in the winter, making it doubly valuable to graziers and farmers. It will also yield an amount of rich, leafy, bottom herbage in the summer months, of which cattle and sheep are very fond and will fatten on. An excellent grass, will stand close feeding well, and will continue growing during long periods of dry weather. Sow two to three pounds per acre. No supplies at present but we may have stocks later in summer.

COOLAH GRASS

(*Panicum prolatum*)

An erect perennial species, found more or less in most of the Australian States, generally in good situations. It makes its growth during the summer months, stands considerable hot weather, usually keeping green well into the autumn. It thus forms a valuable pasture for our coastal and inland country, though it is not recommended for the table lands owing to the severe frosts.

The department have recently been experimenting with this grass in mixed pastures with considerable success. No supplies at present.

NATIVE MILLET

(*Panicum decompositum*)

Noted for the wonderfully quick growth it makes after rain and the weight of leafage it produces in good seasons. It is considered to be a grass well worth cultivating, and it is adaptable to a wide range of soils and climates. It is very drought resistant and of perennial character but makes its growth in the warmer months. Supplies uncertain.

FLINDERS GRASS

(*Anthistiria membranacea*)

Flinders Grass is very nutritious and palatable and under average conditions is easily propagated by seed. It is a great fattening grass; it is good for temporary pasture and makes excellent hay, and even when the grass is matured and dried up stock like it and do well on it. It is worth trying to establish in our inland districts if not already found in the pastures. It also goes under the names of Barcoo Grass and Landsborough Grass.

ROOT PLANTING

When only limited supplies of seed are available or where it is desired to test the value of grasses, it is worth trying to establish plots for experiment and for propagation by root division (where the nature of the root system permits).

Even if only a small quantity of seed be sown it will in a rich piece of land quickly form large clumps and these can be lifted and carefully sub-divided and replanted, say six to nine inches apart, and this course can, if desired, be repeated again and again. For full and interesting information on Native Grasses we would refer readers to Mr. E. Breakwell's new book "The Grasses and Fodder Plants of N.S.W." which we can supply at 6/- (postage 4d.)

PASTURE GRASSES.

FOUR HARDY GRASSES FOR WARM CLIMATES

THESE four varieties, but especially *Paspalum Dilatatum* and *Rhodes Grass* are very extensively used in our dairying districts while *Rhodes Grass* will also succeed well in many parts of our Western Country where the elevation is not great. They should be sown in the late spring, summer or early autumn when the weather and soil conditions are favourable for germination and quick growth.

RHODES GRASS

(*Chloris gayana*)

A very strong-growing grass, which, rooting at every joint, soon covers a large area. About the only grass that will hold its own with *Paspalum*. Excellent for moist situations and hot climates, but succeeds well in a large range of situations and climates, except where heavy frosts are experienced. It is quick germinating after rain and makes growth rapidly and is very palatable to all stock. When well established it is remarkably drought resistant. It is very largely used for surface sowing after clearing and burning off scrub in the coastal areas, and for this purpose there is nothing better. In all the dry inland districts of Queensland *Rhodes Grass* is proving of the utmost value and has also been of great value in Western N.S.W., not only in mixed pastures but as a special grazing crop when planted with *Lucerne*, say four pounds of *Rhodes* and two or three pounds of *Lucerne* per acre. A customer near Wee Waa writes:—"Please quote *Rhodes Grass*. Last year's sowing stood up remarkably considering the gruelling it got with stock. I am quite satisfied that it is a beautiful grass." When sown alone four to six pounds per acre is sufficient if good quality seed is used.



PASPALUM COMPRESSUM

(Also known as Durrington Grass or Carpet Paspalum)

A dwarf compact growing variety of *Paspalum*, proving of great value for poor sandy stretches of country where *Paspalum Dilatatum* does not do well; makes well matted roots, but is most suited for warm climates. Sow five pounds per acre.



Rhodes Grass

PASPALUM DILATATUM

(Yates' Prime "Hand-Shaken")

Does well planted in conjunction with *Rhodes Grass*. The seed should be sown during spring, summer, or early autumn, say from August to April. Succeeds best where moist warm conditions prevail, but will prove a very profitable crop even where a moderate rainfall is experienced, and under these latter conditions it is not so likely to become rank and difficult to deal with. Once introduced into swampy land *Paspalum* soon covers it with a thick mat and gives good grazing where the land would otherwise be useless. Sowing a few pounds of *White Clover* with the *Paspalum* is good practice. Sow ten pounds per acre. Special quotes for large quantities.

COUCH GRASS

(*Cynodon dactylon*)

Stands heat and drought well and is specially suited for hot, dry districts where other grasses do not succeed. It is also of great value for binding loose soil, sand banks, etc. It should not be planted near cultivation paddocks, as it is difficult to eradicate. Sow in warm weather after good rains. Sow ten to twelve pounds per acre.

A SEEDING SPECIFICATION WE CAN RECOMMEND FOR SOWING AFTER BUSH BURNS AND FOR Permanent Pasture

The grass seed should be sown at once after burns to get advantage of the first rains. It will then come on very quickly. Where it is preferred to sow the varieties separately, it is usual to sow the *Rhodes Grass* on the hills and the *Paspalum* and *Clovers* on the flatter and moister country.

- 5 lbs. *Paspalum*
- 10 " *Rhodes Grass*
- 3 " *Danthonia* (Wallaby Grass)
- 2 " *Couch Grass*
- 2 " *White Clover*
- 2 " *Subterranean Clover*
- 2 " *Red Clover*

23 lbs. per acre. (Prices on application)

PASTURE GRASSES (Continued)

THE varieties in the following list are introduced grasses which have proved to have a distinct value in the temperate parts of Australia with a good average rainfall. They can be recommended for the N.S.W. coast and tablelands and for districts with similar climatic conditions in other States. Autumn is the best time for sowing these varieties, but sowings may also be made in the spring in favorable situations if the weather be favorable.

As regards Kikuyu Grass, Elephant Grass, and Texas Blue Grass, these are distributed by roots or cuttings only and these can be put out with advantage from early spring onwards.

TALL OAT GRASS

(*Avena elatior*)

In recent trials in our Northern districts this grass has proved very successful, and it is thought that it will become one of our leading artificial grasses for dry or sandy soils. It has a deep rooting system, which protects it against drought, and it quickly spreads when once established. It is a good winter grass and a quick grower. Stock may at first be averse to it, but when used to it eat it readily, especially if sown in mixture with other grasses. Customers are recommended to try this grass in land which is rather light in character for other artificial grasses, and we would be pleased to have reports after testing.

It withstands heat of summer and the cold of winter, starts very early in spring and continues to give good grazing over a long period. It has been grown successfully in the Departments Trials at Bathurst, Cowra, Wagga and Glen Innes. Sow 25 lbs. to 30 lbs. per acre if alone, but it is best included in mixture with other grasses.

PHALARIS BULBOSA

Were supplies regularly available this grass would be grown more extensively than perhaps any other. Supplies are intermittent and difficult to procure. It is particularly recommended for the tablelands and coast. It is succulent, palatable and a very strong grower, particularly in the winter. It is deep rooting and drought resisting, and, although it may not be equal to Rye Grass, it will grow under more severe conditions, is more permanent and is relished by all kinds of stock. Eight to ten pounds per acre is a good sowing if alone.



Phalaris Bulbosa

KIKUYU GRASS

(*Pennisetum clandestinum*)

We undoubtedly have in Kikuyu a grass of which the quality and capabilities are hardly yet realized by farmers and pastoralists. It is a native of British East Africa and is a perennial grass with a strong system of surface and underground runners. On this account it is a very quick spreading variety and also remarkably drought resistant. Mr. Breakwell (late Government Agrostologist) who is very largely responsible for the widespread interest in this grass, states that it should succeed and be profitable to grow in almost any part of N.S.W. where the rainfall is 20 inches or over. It is of particular value for poor clay or sandy soils where it is usually difficult to grow anything but weeds, though naturally the richer soils will give correspondingly better results.

The underground runners quickly root at the joints then send up fresh growth to a height of 1 ft. or 2 ft. or even more in rich localities.

Under coastal conditions it is the quickest growing grass we have, growth taking place continuously except where frosts are experienced.

On the tableland country and throughout the slopes it will succeed well, and in Queensland also it is creating widespread interest. It will, we think, be found a useful grass in many parts of Victoria, particularly where *Paspalum* is found.

It does not seed in Australia, therefore, it can only be distributed by means of rootlets which we can supply at any time from late winter on. It is recommended to plow the land, open up furrows six feet apart, dropping in the rootlets about over three feet. At this rate about 2500 plants will suffice for one acre. We recommend all to try this grass which comes away earlier than *Paspalum* and gives such heavy yields of very high quality fodder. It adds to the value of the pasturage and gives a more balanced ration if some of the clover family can also be introduced and we suggest $\frac{1}{2}$ lb. White Clover or Subterranean Clover and in cold districts Perennial Red Clover

COCKSFOOT

(*Dactylis Glomerata*)

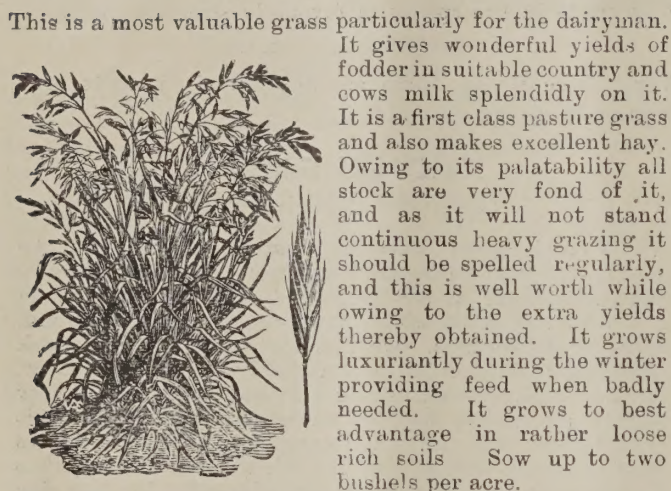
This is one of our most useful introduced grasses and, with Perennial Rye Grass, Fescues and one or two others, should form the bulk of all artificial pastures in the more favored of the coastal and tableland country. It is one of the hardiest of the introduced grasses, withstanding extremes of climate to a wonderful extent. It is inclined to grow tussocky but judicious grazing and occasionally allowing it to seed itself down will counteract this. If sown alone one and a half bushel per acre should be ample.

Yates' Extra Heavy Re-machined—This is heavy thoroughly machine cleaned seed which will give a good germination and a quick and even catch.

PASTURE GRASSES (Continued)

PRAIRIE GRASS

(*Bromus unioloides*)



This is a most valuable grass particularly for the dairyman. It gives wonderful yields of fodder in suitable country and cows milk splendidly on it. It is a first class pasture grass and also makes excellent hay. Owing to its palatability all stock are very fond of it, and as it will not stand continuous heavy grazing it should be spelled regularly, and this is well worth while owing to the extra yields thereby obtained. It grows luxuriantly during the winter providing feed when badly needed. It grows to best advantage in rather loose rich soils. Sow up to two bushels per acre.

Yates' Finest Bright Re-machined—A heavy grade plump seed of a very high percentage of germination and purity.

AWNLESS BROME GRASS

(*Bromus inermis*)

A useful pasture grass which has not been obtainable recently. We have now secured a supply and feel sure there will be many glad of the opportunity of introducing this grass into their holdings. It is a perennial grass, tall growing with root creeping habit, a native of dry regions in Europe and Asia. In America, and particularly California, is looked on as of their hardiest grasses, being most drought resistant.

It is of great palatability and very fattening. Success with this grass has been recorded at Hawkesbury, Bathurst and Glen Innes Experiment Farms, also on the Yanco Irrigation Area.

The early growth is slow and this variety is not at its best until after the first year, but will then stand heavy stocking.

Sow about thirty-five pounds per acre alone or five pounds in mixture with other grasses. In suitable situations it will make good hay which has a high feeding value.

12/6/23

I always insist upon getting your goods as I can rely upon them. During my five years' farming at Wingham it was always Yates' Seeds or Yates' Advice I acted upon, and I have had good results.

K. G. KRAMBACH

PERENNIAL RYE GRASS

(*Lolium perenne*)

On those parts of our coastal and tableland country where a high and regular rainfall may be looked for, this is one of the very best of the introduced grasses, and is a specially good winter grass for the dairy farmer. In suitable localities it is practically permanent but best results are obtained with this as with all artificial grasses by resowing at intervals of say five to ten years. Sow two bushels per acre if used alone.

Yates' Extra Heavy Poverty Bay—Is a wonderful perennial variety saved in a dry climate and therefore much more suitable for Australian conditions than the cheaper grades generally sold which are saved in cool wet climates.

Yates' Special Old Pasture—This is the next best long lasting strain and is superior to a great deal of the Rye Grass offered.

ITALIAN RYE GRASS

(*Lolium italicum*)

This grass is only a biennial but if not grazed too closely and is allowed to seed itself (but not until after the first year), it will last for several years. It is of great value as a hay crop sown alone; with clovers or with grain sow up to two bushels per acre.

Yates' Extra Heavy Re-machined Italian—This is a first class strain, thoroughly re-cleaned, of the ordinary Italian and has given excellent results wherever grown.

Westerwoldicum Re-machined—This is a giant variety of Italian Rye Grass and is earlier and more vigorous. Very hardy.

WIMMERA RYE GRASS

(*Lolium subulatum*)

This is an annual Rye Grass which has proved of value in the northern wheat districts of Victoria particularly for sowing down on lands exhausted by continuous cropping. It provides a large amount of green pasturage in the winter and spring, then ripens off. It can also be sown with wheat or oats as a cover crop and the whole cut for hay.

Mr. W. B. McK—, Murrumbidgee

Please send me your Agricultural Seeds Price List in future, as I find your seeds excel ALL others

Miss J. D. A—,

North Brun Island, Tasmania.

19th March, 1924

We had a wonderful yield from the Berseem Clover last year, feeding it off three times, then getting a heavy cut of Hay.



Thrashing Rye Grass Seed in N.Z.

PASTURE GRASSES (Continued)

POA PRATENSIS (Kentucky Blue Grass)

One of the best winter grasses for dry soils, yielding a large quantity of herbage in the autumn, winter and early spring. It dies right down in the summer, but soon springs again, after rain. It has a creeping habit, resembling Couch, and, if once introduced, will become a permanency. The celebrated Blue Grass regions of America, so noted for their horses, take their name from this grass, which forms the bulk of the pastures there. As this grass is very delicate, and easily burnt up while in its younger stage, we recommend that it be sown in the early autumn only.

TEXAS BLUE GRASS (Poa arachnifera)

This grass proved itself to be a drought resister of great merit. Best suited to light and sandy soils, roots planted a foot apart will soon cover the whole area. Valuable for cattle, stands heavy stocking. This grass can only be supplied in roots.



Agri. Dept. Photo.

ELEPHANT GRASS (Pennisetum purpureum)

Although not strictly speaking a pasture grass, this recent introduction has proved to be a valuable acquisition and a fodder plant of considerable value. It will be noted from the photograph, reproduced herewith, that this is a vigorous growing plant, attaining a height of 12 to 15 feet. It stands cutting well, tests made by the Department of Agriculture showing a return of 50 tons and more of green fodder per acre per year, and also that this grass is of good feeding quality and that stock relish it, especially if not allowed to get too high and coarse. It may be either grazed or cut, and shows a very satisfactory food value by analysis. Milk yield and tests are well maintained. Elephant Grass is adapted to a wide variety of soils and climates and might well be tried out by progressive farmers, even if only on their poorer land. The cuttings should be planted three feet apart in and between the rows.

TALL FESCUE (Festuca elatior arundinaceae)

This grass has proved to be a distinctly valuable one, especially for poor land in our coastal districts. While it has not the feeding quality of, and is not relished by stock like Rye Grass, Prairie and Cocksfoot (we do not recommend it for land which will grow these grasses), it stands drought and hardship better, keeping green when other grasses are burnt up, and affording excellent grazing when the sweeter grasses either will not succeed or are shrivelled up. We would recommend a proportion of this in all mixtures for poor, dry, or hilly land.

CHEWING'S FESCUE

A variety of Hard Fescue, which has been grown in New Zealand with success on poor, light, as well as heavier lands; it has formed a good sward where no other grass would succeed. It stands drought well, as its strong roots penetrate deeply into the ground. It is permanent and throws up a large amount of feed in the early spring, particularly good for sheep. We would recommend that a little of this grass be included in all mixtures for permanent pasture, or, if planted alone, allow fifteen pounds per acre.

MEADOW FESCUE (Festuca pratensis)

An excellent grass for elevated districts and in good soils. Should be included in all mixtures, except for very dry soils. It is relished by all stock and makes excellent hay. It is perennial, early and nutritious.

AGROSTIS

These grasses are used fairly largely for lawns, golf greens, etc., and their value for pasturage is low except in cold, harsh situations. We stock—*A. canina* (Brown Top); *A. vulgaris* (Red Top); and *A. stolonifera* or *alba* (Creeping, Bent or Fiorin).

OTHER GRASSES

We also stock the following, which, however, are of minor importance except for special situations or purposes. Timothy, Poa Trivialis, Poa Nemoralis, Meadow Fox Tail, Crested Dogs Tail, Yorkshire Fog, Rib Grass or Lambs Tongue.

TEFF GRASS (Eragrostis abyssinica)

An Annual Summer growing grass in very great favour in South Africa especially where summer rains are prevalent. Its rate of growth is astonishing and it may be cut twice or more during the season if sown early. Under good conditions it supplies excellent summer grazing and makes very fine hay. Sow 6 lbs. to 8 lbs. per acre broadcast. For Australian conditions we think Sudan Grass will give better results, and we only recommend trials of Teff Grass where there are ample Summer rains. It must be resown every year.

PRICES

For all Prices see our Current Price List of Farm Seeds, post free at any time.

CLOVERS

A short description of some of the leading varieties of a wonderful family of plants which do much for the Agriculturist—feed his stock—improve his land—and increase the subsequent crops.



FARMERS, especially those in areas where a fair rainfall is experienced, are realizing more and more the great value of the Clovers as **Soil-renovators**, as well as fodder crops of the highest quality, either alone, in pasture, or sown with other greenstuff or hay crops.

For renovating worn-out land, and for keeping valuable farming land in proper condition, nothing will do more good than the Clover family (or if preferred other Legumes, such as Field Peas, Field Lupins and Soy Beans, and in warm climates Cow Peas). They take little out of the soil but add a most valuable manure in the form of nitrogen, which is gathered from the atmosphere. When the crop is ploughed in, the nitrogen is made available, while the foliage, stems and roots, form necessary "humus," which gives "life" to the land.

The addition of one or other of the Clovers, when laying down pastures or sowing greenstuff or hay crops, will provide a much **better balanced ration** of which stock are very fond; and when the crop is done the Clover will often give a good picking for a considerable period, afterwards being ploughed in for **green manure**.

Clovers succeed best in good "sweet" land and usually respond well to superphosphate. Sow 12lbs. to 15lbs. per acre alone, or if with pasture grasses 2lb. to 3lb. per acre.

Generally speaking, Clovers should be sown in the autumn, but in good seasons successful results can be obtained from spring sowing.

YATES' AY SUPERFINE WHITE CLOVER.

(Trifolium repens)

This is used perhaps more than any other for sowing down with Pasture Grasses. It spreads quickly, especially in moist situations. Widely used on the North Coast of N.S.W. in Paspalum and Rhodes Grass Pastures, giving a splendid pick during the winter when these two grasses are more or less dormant. Succeeds in a wide variety of soils and climates.

YATES' ENGLISH WILD WHITE CLOVER.

A hardier and more lasting strain than the ordinary White Clover; its root action is stronger, and it is of dwafter and denser growth, and of more rapid creeping habit. Our seed is saved from long-established English pastures, and we recommend a little with all grass seed mixtures.

YATES' SUPERFINE N.Z. PERENNIAL RED CLOVER (or Cow Grass)

(Trifolium pratense perenne)

Succeeds best in the cooler table-land country as it requires a fairly consistent rainfall. It is a vigorous grower, and splendid for milk production; under suitable conditions it will last several years. Recommended for sowing with Oats or in pasture.

TRIFOLIUM INCARNATUM (or Crimson Clover).

This is an annual, a quick grower, and will stand a great deal of hard grazing. It is useful as a stubble plant sown alone or with Rye Grass after the grain crop, when it will produce a heavy crop very early the following spring.

ALSYKE.

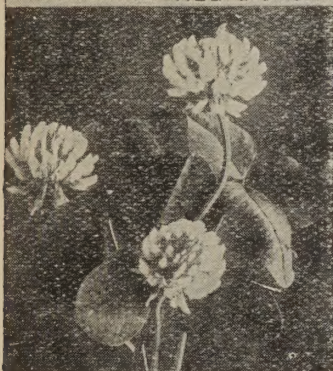
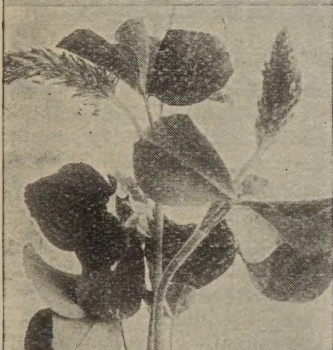
(Trifolium hybridum)

Combines to some extent the qualities of Red Clover and White Clover. It will sometimes succeed where Red Clover does no good, and can be classed as permanent in suitable locations.

BERSEEM (or Egyptian Clover).

(Trifolium Alexandrinum)

An annual clover which **must be sown in early autumn** as it makes its growth during the autumn, winter and early spring months. Sown in early autumn in a favorable locality, it will give two and even three cuttings of valuable Lucerne-like greenstuff during the winter and early spring. It can also be sown in the autumn with Oats, and after being grazed for a time it can be cut in the spring with the Oats for hay.

FOUR USEFUL
CLOVERSYates Superfine
Perennial Red CloverYates Superfine
White CloverTrifolium incarnatum
(Crimson Clover)Berseem
(Egyptian Clover)

CLOVERS (Continued)

YATES' A.Y. SUBTERRANEAN CLOVER

(Trifolium subterraneum)

WE are convinced that Subterranean Clover will play a most important part in farming practice in a great many parts of this State. Where soil and seasonal conditions are favorable this Clover will produce more high-class fodder than almost any other plant.

As to soil requirements, this plant accommodates itself to a very wide range, and indeed, we think that its great value as a "soil improver" will cause it to be sown on a great deal of second-class land to the great benefit of the soil, and resulting in bigger returns to the land-holder. Subterranean Clover responds readily to phosphatic manures so that Super can be used with advantage.

Climatic conditions required are a fairly regular Autumn to Spring rainfall. It should do well in this State on all parts of our coast and tablelands, and parts of the western slopes where the rainfall exceeds twenty inches.

Its main use is for grazing green, or when matured as a dry feed. In addition, it is a great soil improver, and of great value in choking out undesirable weed growth.

It is only an annual, but as it produces most of its seed just below the surface of the soil (hence its name), it is in practice perennial, and once introduced and properly established, it is permanent.

We recommend sowing in all mixtures of grasses at the rate of half to 1 lb. per acre. Sown with cereal crops 2 lbs. per acre should be sufficient, while if sown alone on properly prepared land, from 4 lbs. to 6 lbs., and even up to 10 lbs. per acre may be planted, according to the quality of the land. Smaller sowings may be made if time is allowed for the clover to spread, which it does very rapidly. In our Paspalum country it should be specially welcome, as it has proved in similar country in north N.Z. to be of great advantage in preventing the formation of close "mats" and in providing a better balanced ration.

STRAWBERRY CLOVER

(Trifolium fragiferum)

An excellent variety for low, wet, swampy land subject to floods or inundations through the backing up of tide water. This plant has a trailing habit, and thrives where no other Clovers and very few grasses will grow; in our opinion, it should be associated with Water Couch. If one pound or so per acre is sown in suitable situations, it will very soon spread. It is very largely grown in portions of Gippsland, where the land is swampy, and is found to be very fattening. Cattle do particularly well on it.

SHEARMAN'S CLOVER—Similar to the above and probably a variation; root only of this variety.

ENGLISH TREFOIL

(Medicago lupulina)

An annual Clover succeeding in light dry soils, greedily eaten by sheep. It has good bold seed.

LOTUS (Varieties).

LOTUS CORNICULATUS (Birdsfoot Trefoil)—A deep rooting perennial Clover maturing the second year, and producing a large quantity of leafage.

LOTUS MAJOR—Land that requires draining can often be improved with this Clover.

LOTUS ANGUSTISSIMUS—A hardy Clover which does well in rough country and should be very suitable for sowing on burns.

MEDICAGO ORBICULARIS

(Burrless or Button Trefoil)

This is a variety of Trefoil Clover which has attracted attention in Tamworth and other Northern districts. It is very similar in its growth and appearance to our Native Trefoil or Burr Clover, but the seed is not enclosed in a burr; this is manifestly a great advantage to woolgrowers. It is an annual, but seeds itself so profusely that it comes up every spring, and is permanent when once introduced.

MEDICAGO DENTICULATA

(Burr or "Native" Trefoil)

This is an introduced member of the Clover family but has become so widespread that it has earned the title of "Native." It is now one of the commonest plants in N.S.W. and furnishes a tremendous amount of feed. It grows with the first good autumn rains giving a heavy yield of lush green fodder throughout the winter and spring. With the approach of summer the plant ripens off and the seed, falling on the ground, then forms a most valuable and highly concentrated food. This the sheep will lick up from the ground and do well on it. Country that grows this Trefoil is essentially fattening country. The burrs are a great disadvantage in purely wool growing country.

LUCERNE

THE KING OF FODDER CROPS

"The crop that gives a continual harvest without an annual ploughing or seeding."

YEAR by year this King of Fodder Crops is proving its adaptability to varying situations, soils and climates. At one time it was thought that it would be a sheer waste of seed to sow anywhere but on choice alluvial flats; but now we find Lucerne extensively grown on **ordinary good agricultural land** and even on **hilly upland country**. Of course it is not suggested that such heavy growths or so many cuts in the season occur on the hilly land as are produced on typical Lucerne flats, but even where Lucerne does only moderately well **there is no other crop to compare with it.**

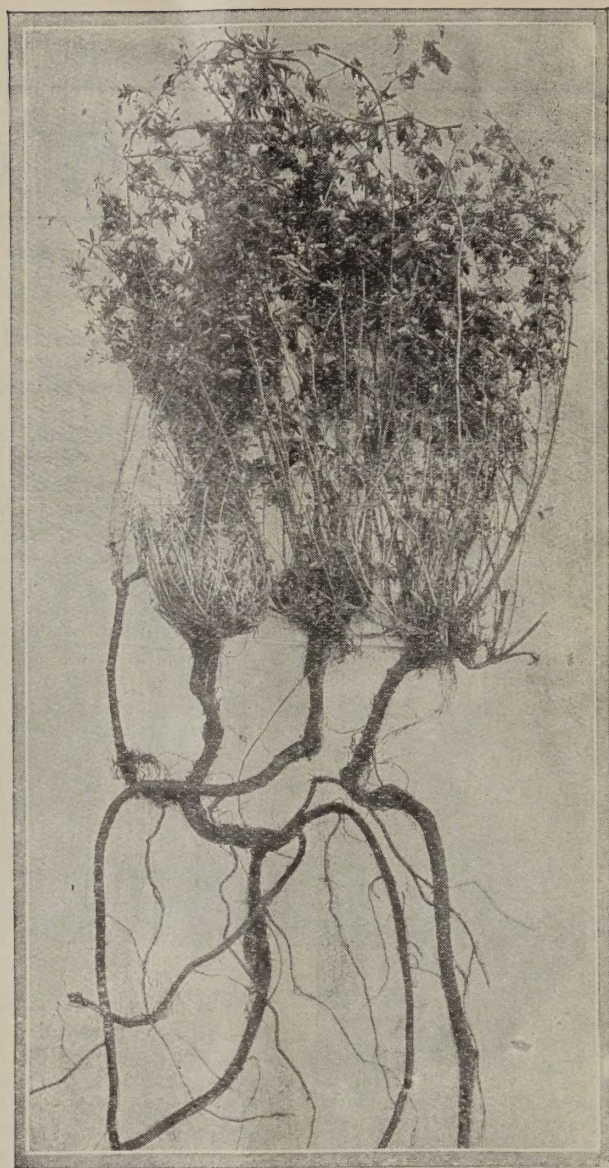
Many of our coastal dairying districts are capable of growing good Lucerne.

Its great value for milk production, for hay crop, for grazing and for poultry, makes Lucerne of almost universal interest, and it is worth while for every farmer to find out for himself if Lucerne will succeed on part of his holding.

The point we would emphasise here is that the "range of adaptability" of Lucerne, once considered limited, has now been proved to include soils and conditions ranging from rich alluvial flats—where one may reckon on five, six, or even more cuts per annum for ten years or so—to any reasonably deep good agricultural land with a rainfall of say 20 inches or over, where good "grazing" Lucerne can be successfully grown, giving the land a much heavier carrying capacity and a wonderfully quick "shoot" after rain.

In years to come we think that Lucerne will be equally valued by Australian farmers for the wonderful grazing it affords as for its hay making qualities. The amount of suitable land for growing continuous heavy crops of hay is limited as is also the available labor for hay making and the ready market for Lucerne Hay, but there are thousands of square miles suitable for growing grazing Lucerne, and which would give one good cutting of hay per year if required, and during the remainder carry three to four times the sheep per acre as compared with the natural grass or herbage, and would fatten them at the same time; for lambing ewes or for topping off lambs or grown sheep nothing can equal Lucerne. Some farmers believe that Lucerne will not stand grazing, they have seen Lucerne paddocks eaten out in times of drought, when it was the only green feed available, and were thus greatly overstocked. Of course, no perennial plant will stand continuous overstocking, but it is wonderful the amount of stock Lucerne will carry even in dry seasons if it is properly managed. Lucerne should not be continuously grazed heavily, but if it is allowed to grow till it begins to flower, or as near that stage as possible, then it can be heavily stocked and eaten right down; this process can be repeated several times in a season, and if there are three or four separate paddocks in Lucerne they will afford constant grazing. During the winter, however, provided the heart of the plant is not eaten out, Lucerne can be fairly continuously grazed. If a spring tooth cultivator is put over the land occasionally and the surface torn up, the response in the extra growth of Lucerne will be beyond belief.

This course should be followed at least once each year, preferably in the early spring before the Lucerne commences to grow, but a second cultivating in the late summer will well repay its cost. Providing the cultivator tines are



sharp pointed no fear need be entertained about putting the machine well down into the ground. The strong roots stand a deal of knocking about. The sharp pointed tines slip past the tap roots and do not cut them off completely. We strongly recommend cultivating both ways up to six inches deep. A dressing of one cwt. of superphosphate per acre each year will add wonderfully to the yield and encourage quick growth.

The paddock will look like a fresh fallow when the cultivator has done its work, but, within a week, if there is any moisture in the soil at all the fresh shoot will show through and in a fortnight a strong succulent growth will be evident. If this is a spring growth, allow it to come just to the beginning of the flowering stage and then cut for hay. If you have cultivated in the early autumn the resultant growth can be grazed during the winter as described. The great importance of a late winter or early spring cultivation is two-fold. Firstly, the growth is stimulated remarkably; secondly the ground is cleared of thistles, barley grass and trefoil, and your early summer crop of hay will be a clean one. It is always advisable to let the Lucerne grow to maturity once each year, that is to the flowering stage. The spring crop is the best, and this can profitably be made into hay. Even if there is no immediate use or market for it an accumulation of Lucerne Hay is a reserve against times of drought and scarcity that will come in most opportunely sooner or later. One of the great advantages of Lucerne Hay if protected from the rain is, that it does not deteriorate by age or by the ravages of vermin.

(Continued next page)

YATES BROADCAST A.Y. GIANT-UPRIGHT LUCERNE

(Continued from previous page)

Grazing Lucerne will do well on any country, hilly or flat, provided the following conditions are fulfilled: The plant is essentially a deep rooter and a lover of moisture. But so hardy is its nature that it is capable of penetrating to great depths in search of moisture. In most country, with a fair average rainfall, say, from twenty inches, soil of the right type for Lucerne retains its moisture through most dry spells at a depth Lucerne is capable of reaching. This will not necessarily be enough to cause growth, but the plant will remain in a semi-dormant state and will respond at once to any shower of rain. But the Lucerne tap root must be able to get down, therefore very shallow soils with a stiff-clay close to the surface are not suitable for this crop. The soil besides being reasonably deep must also be "sweet," it must not be deficient in lime. Most of the soils west of the dividing range in New South Wales are "sweet" enough for Lucerne. Some of the coastal soils are not "sweet" in the sense that they are deficient in lime. Such soils can be made to grow Lucerne well by top dressing with lime. This has been proved at Exeter.

Suitable hilly land if planted with Lucerne will carry four to six sheep per acre for the greater part of the year. Rich moist creek or river flats will of course carry much more, but we consider such land more suitable for hay; stock should only be grazed on alluvial land when it is dry and the Lucerne reaching maturity, otherwise the surface will be trodden hard and the plants injured. Cattle, par-

ticularly dairy cows and working bullocks, as these are usually hungry and eat greedily, are apt to become blown or hoven if grazed on young succulent Lucerne, especially if it is damp with rain or dew; it is found however on the dairy farm at Exeter, N.S.W., that a few acres of Lucerne, which were planted about ten years ago, is the most valuable grazing area on the estate; the cows after milking are put on to this patch for an hour or so in suitable weather only, and when this care is exercised no cows are lost and the milk yield is very largely increased. Treated in this way there is no outlay for hay making, while the full benefit of the enormous yield of Lucerne is obtained. This Lucerne paddock is regularly spring-toothed at the end of each winter, and every year it is dressed alternately with superphosphate or air slaked lime. This paddock is on the top of a rich volcanic hill, the soil is chocolate and very deep. When cattle are continuously grazed on Lucerne they are no more subject to blowing than they would be on trefoil and other leguminous herbage common in the western districts of New South Wales, but care is required that the cattle are not hungry when they are first put on to the Lucerne or any other clover, especially in damp weather or when the plant is wet with dew. As compared with the native clovers, Lucerne has the very great advantage of growing during the summer and early autumn when the wild herbage and trefoil is burnt up and green fodder is usually not available.

YATES BROADCAST A.Y. GIANT-UPRIGHT LUCERNE

YATES' BROADCAST A.Y. GIANT-UPRIGHT LUCERNE in sealed bags is re-machined and tested seed of a superior extra prime quality type of N.S.W. grown Lucerne, which is saved on selected farms in those districts in which owing to special natural conditions, there has been evolved a long standing drought resisting strain, which has proved itself for Australian conditions.

Most of these farms have supplied the seed crop to us, for many years past, and we know that it is of the true Broadcast Giant Upright pedigree.

YATES' BROADCAST A.Y. GIANT-UPRIGHT LUCERNE is supplied through our country agents in 25 lbs. and 50 lbs. net sealed bags, printed with our own brand, or will be supplied direct to farmers in whatever quantities required. Growers should exercise caution, and accept only packages closed with our metal seal, and branded as above.

WRITE FOR PRICES, STATING QUANTITY REQUIRED

Sixteen to twenty pounds per acre is a fair sowing for good situations with a moist subsoil if sown broadcast; or ten to twelve pounds if drilled. In dry areas as low as six pounds is found sufficient.

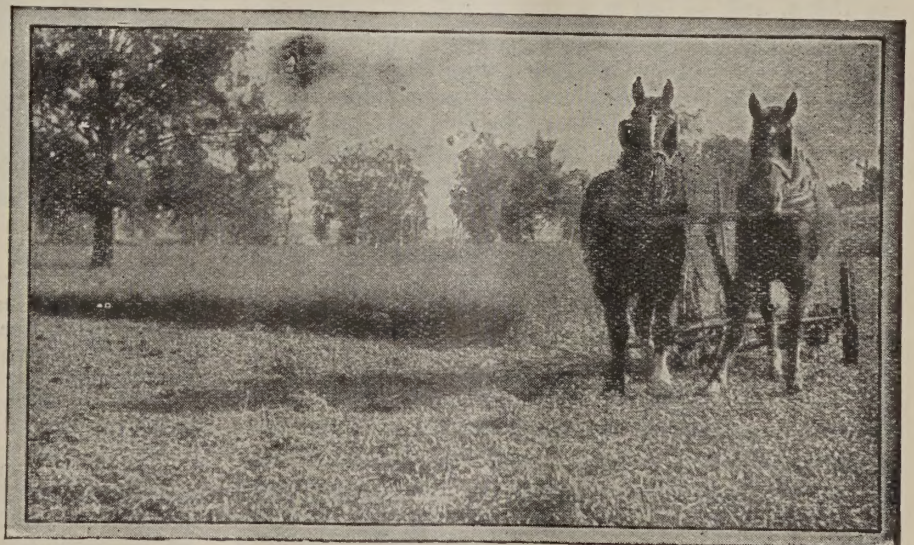
A customer in British East Africa writes:
April, 1924.

"A friend of mine, ———, Manager of a big estate of some 40,000 acres in this district was very much struck by my brother's Lucerne, and asked me how he could obtain some to plant before May. If we, in this district leave it until September, our other planting season, it is eaten off by cut worm. So this meant losing a whole year, unless he went in for some other brand, which I strongly advised him not to do, as there is nothing that can come up to your Hunter River Broadleaf, though some four or five different kinds have been tried to my knowledge from different countries in the world. So I took the liberty to tell him to cable for it in my name."

Mr. F. C. M——, Keraug, Vic.

May 7th, 1924.

You have been recommended to me by the Supervisor of this new Settlement; he told me that he had wonderful results from "Lucerne" Seed supplied by you; he also told me that the P—— Bros., of Tongala, sowed Lucerne Seed supplied by you in last week of September, and up to March had taken three cuttings, this takes some beating."



A typical stand of cutting Lucerne on rich alluvial flats. During a large part of the year this is cut every four to six weeks.

Write for Yates' Booklet on
LUCERNE GROWING Post Free
It will give you much information.

LEGUMINOUS CROPS

While all these crops are of very great value as feedstuffs in some form or other, they have the additional advantage of being the best of "Soil Renovators" and increasing the fertility of the soil.

Their value for rotation, also for green manure, can hardly be overestimated

COW PEAS

Cow Peas form perhaps the most valuable crop for green soiling that we have for the coastal and warm parts of this country. They are extensively used for this purpose in the sugar fields of Queensland, and will doubtless form the main legume for the crop rotation now being found so necessary in connection with maize growing, especially on our North Coast. Cow Peas make excellent pasture, fine hay and splendid ensilage (especially in conjunction with other green crops) and as well as all this do more than almost any other crop to improve the soil. The Cow Pea is an annual making its whole growth during the summer months. In general appearance, habit of growth and character, and composition of seeds it resembles fairly closely the ordinary Kidney Bean. We urge farmers to consider the advantages of sowing Cow Peas with Maize. Sorghums and Millets, either for green fodder or ensilage. Not only will the combined crop make a better balanced ration, but the total yield will be increased and also the condition of the land improved. Sow in spring after frost is over in drills 3 ft apart and drop peas at intervals of 9 to 12 inches in the drills. Sown in this manner 10 lbs of seed should well cover an acre, broadcast $\frac{1}{2}$ to 1 bus. of seed is required. Supplies of Cow Peas owing to difficulty of harvesting are always uncertain and prices vary considerably. We expect to have Clay colored and the Black seeded and will quote definite prices on application.

SOY BEANS

The Soy Bean is an upright annual growing two to three feet high. Immense areas of this crop are grown in U.S.A. and we feel sure that it will be largely used in the future in this country in those districts which are a little too cold for Cow Peas. Besides its green manuring value the Soy Bean gives good green fodder, makes excellent hay (fully equal to Clover or Lucerne) and is a fine silage plant, especially if grown in conjunction with Maize, etc. For pig growers the crop will prove most profitable as the seeds are produced very freely and contain a very high percentage of protein, and an extraordinarily high percentage of fat. In this respect it is unlike any other legume except the peanut. The N.S.W. Dept. of Agriculture recommend this crop especially as an emergency hay crop in our Tableland districts. It should be cut when the seeds are about half developed. It is sometimes difficult to get a good stand where they have not been grown before and we suggest those interested should try small plots for experimental purposes. Sow the seed about three to the foot in shallow drills two-and-a-half feet apart after danger of frost is over. We have a limited stock of Wilson's Early Black and other early varieties. Particulars on application.

VELVET BEANS

A valuable plant for moist warm climates such as North Coast of N.S.W. and the Coastal districts of Queensland.

Where conditions are suitable it is the rankest grower and heaviest yielder of any of the legumes. As a soil renovator it is excellent, but it will be valued even more for the magnificent grazing it affords and for the high feed value of the beans. It is also recommended as a very suitable crop to sow with maize either for grazing or for ensilage, in this case the Beans should be sowed about a month later than the maize. If sown alone plant in rows 4 feet apart and about 18 inches between the seeds or two or three seeds in hills four feet apart in rows five feet apart.

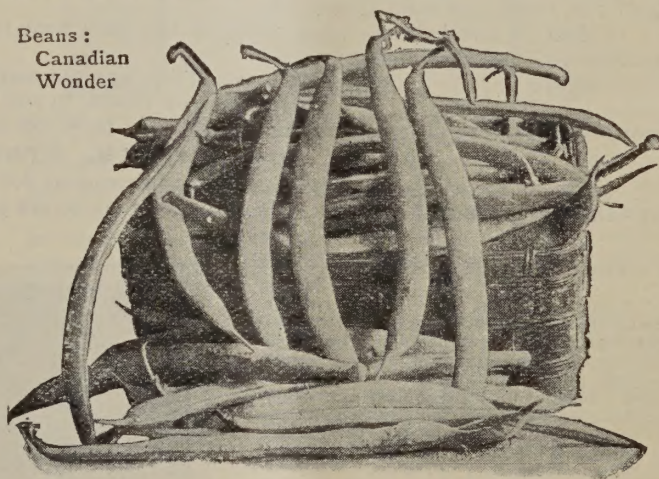
We expect to have limited supplies of the following:—

Speckled Velvet Beans—One of the earliest sorts and therefore suitable for the lower coastal districts, especially for forage and soil improvement.

Osceola Velvet Beans—Another early sort with large pods and very vigorous. Comparatively free of furze on the pods.

Bunch Velvet Beans—Of less vining habit than the other varieties and rather later. A good sort for growing with Maize.

Beans:
Canadian
Wonder



MARKET BEANS

For the warmer districts round Sydney and on the North Coast, beans are the prevailing market crop and in those districts where early crops are possible very handsome returns are being obtained. The same remarks as to the desirability of growing this crop apply as they do to peas. As to varieties, Canadian Wonder is the standard sort, but there are inferior strains offering. YATES' SELECTED CANADIAN WONDER are the prime samples offering of a heavy cropping type. No better bean for market growing is offered. Usually 2 bus. per acre is a good sowing and we advise sowing in drills far enough apart to permit of frequent horse cultivation in the early stages of the crop. Prices on application.

LEGUMINOUS CROPS (Continued)

MARKET PEAS

In the Highland districts round Sydney and on the Tablelands, many farmers now devote a portion of their holding to the growing of green peas for the Sydney market, and in recent years this has proved very profitable. The growing of peas or beans for the vegetable market is excellent practice from a rotation point of view; it rests the land from ordinary farm crops, gives it the advantage of a leguminous crop and leaves the land in an improved condition for succeeding crops. A fair quality of land and a reasonable use of suitable manure are advisable for best results. YATES SELECTED N. Z. Grown YORKSHIRE HERO PEAS is the best main crop variety and there are also now other sorts which are rapidly coming into favour, and we shall be pleased to quote particulars of varieties available on application. Usually 2 bus. per acre is a good sowing and we advise sowing in drills far enough apart to permit frequent horse cultivation in the early stages of the crop. Unfortunately owing to weather conditions this year's harvest was extremely poor and some sorts are now sold out.

PEANUTS

As well as being in great demand for human consumption, the Peanut is being increasingly used as a stock fodder, especially for pigs. They will succeed best in a warm climate in a light open soil. Sow thirty to forty pounds of nuts, or say ten pounds shelled seed per acre. When ripe, lift the plants and harvest the nuts which are produced below the ground. The Peanut plant may be grazed, the tops made into hay, or used as a soil renovator; and is valuable as a dry farming crop. We usually have in stock supplies of tested growth of the small podded local grown variety and the large podded North China Nut. Customers are asked to state their preference when ordering.

FIELD PEAS

This is a crop which we consider does not receive the attention it deserves. It is an excellent fodder for sheep, pigs and other stock, but we think its main value is when grown as a combined "legume-cereal crop." For this purpose Field Peas are excellent sown with oats or wheat. If sown early with oats they can be grazed off once or twice during the winter and then let go dry for hay. The addition of the pea straw to the oaten hay makes a much more balanced ration and is very palatable to stock.

If sown alone they may be grown for topping off to maturity and when cut fed to pigs, or they may be cut green, just after flowering, for cattle or pig feed.

This crop is classed among the best of the soil improving crops. Even if only the roots are ploughed in the soil is greatly enriched.

Field Peas though not so hardy as Tares or Vetches are earlier maturing usually cheaper in price, and one grower reports that when grown with a cereal it will stand the trampling of grazing cattle better than will Tares under similar conditions. Field Peas can be sown in the autumn or spring but in mild districts we prefer autumn sowing.

Sown alone $1\frac{1}{2}$ to 2 bushels per acre broadcast or say 30 lbs. in drills 2 feet apart.

Sown with cereal crop try $\frac{3}{4}$ bushel Field Peas with $1\frac{1}{2}$ bushel oats or wheat per acre.

We usually stock the Grey Field Pea and the Blue Field Pea, but for fodder purposes in N.S.W. recommend the Grey variety.



Grey Field Peas, North Coast, N.S.W.

ANNUAL BLUE LUPINS

For green manuring these provide one of the best crops for ploughing in especially in our cooler districts. When practicable we recommend autumn sowing but they will succeed if sown in early spring. Lupins grow very rapidly and produce an immense amount of top. Sow at the rate of 2 bus. per acre. For small trials 3 lbs. will sow an area of 100 square yards (10 yds. x 10 yds.)

TARES or VETCHES.

Grey, Black, and Golden

These must be sown in early autumn only and are some of the best plants for winter fodder. Sown with a mixture of Oats, Rye, or Barley, or better still, a little of each (say one-and-a-half bushels of Tares and half-a-bushel of Grain) they will yield an enormous crop of green-stuff, particularly suitable for milking cows. As they belong to the Pea tribe, they rather improve the land than exhaust it; cows milk well on it and pigs fatten on Tares. Sow about two bushels to the acre.

HORSE or TICK BEANS

Somewhat similar in appearance of plant and habit of growth to the garden Broad Bean. They are grown in cool climates for the seeds which form excellent foodstuff. When well harvested the haulm also makes useful fodder. Sow about two bushels per acre in the autumn and early winter.

KUDZU VINE

(Pueraria Thunbergiana)

We have had several enquiries for this. It is a perennial legume best adapted for poor soils near the coast. We can only supply in packets and recommend that the seeds be sown in a good patch. The plants will quickly grow and send out long runners which root at every joint. These can then be severed and transplanted and the required area thus quickly covered. Packets 1/-.



SEED MAIZE

SELECTED AND
SPECIALLY RE-GRADED SAMPLES

MAIZE is a summer crop of the utmost importance in all districts where a reasonable fall of summer rains can be counted on. Even where the summers are usually on the dry side, Maize can be successfully grown if sown in drills and carefully and regularly cultivated.

In cool districts where maize will not ripen, it is still a most valuable green fodder for early autumn use. We strongly recommend sowing in drills, even when only needed for green fodder or ensilage.

The extra weight of crop from a paddock of green Maize sown in drills and cultivated will more than repay the extra cost of labor. Should the season turn dry a fair yield would result from cultivated Maize, whereas the broadcasted crop might be a failure.

By sowing the early maturing varieties it is possible to harvest a crop of grain in districts where the later maturing sorts will not ripen. The best time for sowing Maizes varies somewhat in the different districts. For green crop or ensilage, Maize can usually be sown a month or so later than would be necessary for a grain crop.

As the majority of our customers will require seed Maize for green crop we would advise them not to overlook the White Grained varieties as, generally, besides yielding a heavier grain crop than the Yellow sorts of the same class, they are all exceptionally good green crop Maizes, producing a heavy leafy succulent growth.

Sow about four quarts per acre in drills for grain, and one bushel to one-and-a-half bushel broadcast for green feed. Prime samples are again scarce this year and prices are rather higher than usual. But in view of the really small quantity of seed required per acre this should not be considered, and farmers in their own interests should not begrudge the small extra cost of selected and specially graded samples.

Early Morn—Exceptionally early, recommended for cold districts or or very hot dry districts where earliness is essential.

Ninety Day—An early flint. A good early green crop variety. Supplies will be late this year.

Small Early Leaming—An early green crop Maize. We have the red grained variety.

Small Early Red Hogan—A fine early green crop variety.

Silvermine—Earliest white, grain deep and solid, excellent early green fodder; hardy.

The above five varieties are noted for their earliness, suitability for green fodder crops and, with the exception of Ninety Day, they are all heavy yielders of grain considering their short growing season.

Funks Early Yellow Dent—One of the earliest of the Dent varieties and a splendid variety especially for the tablelands and slopes.

Wellingrove (or Early Yellow Dent)—Heavy cropping, deep grained.

Hickory King—Main crop, similar to preceding, but with broader grain

Giant White—Excellent main crop. Grain large, deep and solid; Splendid green fodder.

Manning White—Heavy main crop; large deep grain.

Selected Yellow Moruya—Main crop. Splendid large rich yellow grain.

Coldmine—Favoured as an early main crop on the South Coast. Deep yellow grain.

Large Red Hogan—Attractive mid-season sort; very hardy and heavy cropper.

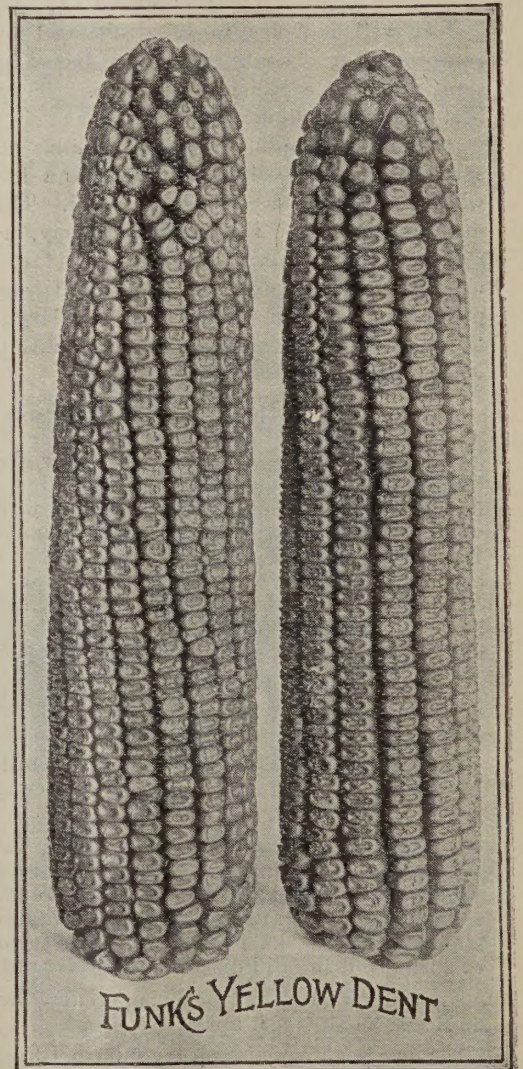
Yellow Hogan—Main crop; very similar to above, except in color. One of the very best Maize we have.

Yellow Horse Tooth—Main crop; a deep, soft-grained Maize, largely grown on our Northern Rivers.

White Horse Tooth—A very deep soft-grained Maize, tall growing, largely used on our Northern Rivers; a late sort.

Yellow Hawkesbury—Deep broad grain, splendid in warm districts; heavy cropper.

Fitzroy (or Improved Yellow Dent)—A heavy cropping deep grain variety, suitable for green fodder.



FOR PRICES SEE CURRENT
PRICE LIST—POST FREE

THE IMPORTANCE OF ROTATION WITH LEGUMES IN MAIZE GROWING.

IN most districts where mixed farming is carried on Maize is a summer crop of the utmost importance. Even where the season is too short to ripen the grain the green fodder produced is of great value, either for cutting and feeding in the autumn, or for storing away in the silo for future use. In the true maize districts the grain crop is a staple one and if for any reason this fails it is a serious matter for the farmers in those districts. Now, if by using the fallow maize lands in the winter for growing other crops, we can materially improve that land for maize next season, it becomes a matter of real interest to farmers to test such renovating crops.

As a rule the best maize flats are subject to occasional flooding and a deposit of new soil is thus left on the surface. This keeps the land rich and well supplied with the necessary plant food and humus. After a time, maize land which is never flooded loses its "strength," the crops dwindle, and the use of superphosphate and other artificial manures must be resorted to. The main reason for this is the gradual depletion of the readily available plant food and the humus, or organic matter in the soil.

Table showing plant food removed from one acre by an average Maize crop.

Crop	Nitrogen	Phosphoric Acid	Potash
Maize (grain) 50 bushels	50.0 lbs.	24 lbs.	16 lbs.
„ (stalks) 3,000 lbs.	25 lbs.	7½ lbs.	36 lbs.



On our Seed Farm we grow Peas as a rotation to keep the land fertile and in good heart.

It will at once be noted that Nitrogen is one of the very necessary constituents of good maizeland. Potash is usually well supplied in the land, and in any case most of the potash is returned to the land in the stalks and leaves of a grain crop. Phosphoric Acid is cheaply available in the form of Superphosphate, but Nitrogen is an expensive item to put on the land in the form of artificial manures. Whereas a fifty bushel crop of Maize will take from the land 50 lbs. of Nitrogen, an ordinary dressing of a nitrogenous manure adds only about 10 lbs. or 11 lbs. to the acre. While this has a valuable stimulating effect on the crop, we must look elsewhere for a cheap means of supplying this important plant food.

NITROGEN FROM LEGUMINOUS CROPS

All leguminous crops, such as peas, vetches, cowpeas, clovers, etc., have the power of drawing their Nitrogen needs direct from the air. This element is stored in the roots and foliage of these plants and when the whole, or portion of such crops are ploughed under, a large amount of cheap Nitrogen is added to the soil. If such a leguminous crop is cut and removed the benefit is curtailed, as only a portion of the Nitrogen is stored in the roots and stubble; but if the field is grazed, as in the case of clovers, cowpeas, vetches, etc., a considerable amount of the crop is returned to the soil by trampling and animal manure. A crop of peas for thrashing, or green marketing, will yield back to the land the Nitrogen contents of the straw and roots.



This is an annual Clover, making its growth in the winter and spring. It should be sown as soon as the weather breaks in late summer or early autumn.

For the purposes of improving the Nitrogen contents of maize land and for improving the texture of the soil between the maize crops, we recommend the following legumes. Field Peas, Market Peas (for picking green), Crimson Clover (*Trifolium Incarnatum*) Berseem or Egyptian Clover, and Tares and Vetches. We shall be pleased to give particulars as to the best varieties for different districts, supplies available and prices, on application. We commend to farmers the N.S.W. Department of Agriculture's Farmer's Bulletin, No. 134 (October 1920), "Soil Improvement for Maize," for further information.

SORGHUMS

FEW fodder plants are held in such general favor in such a wide range of districts as the Sorghums. This plant has wonderful adaptability to different soils and climates, and will produce big yields of splendid fodder where maize would fail.

The early varieties grow quickly even on poor land and under droughty conditions, and give green feed when most other things are withering. The late sorts grow under similar conditions, and stand well into the winter—even when the flag is frosted the stalks retain their succulence and sweetness—and provide a very palatable and fattening fodder when it is most acceptable.

Many farmers are reluctant to grow Sorghum for fear of poisoning their stock; but the Sorghums are too valuable to exclude, and if the following is noted, they can be fed to stock with perfect safety. Sorghum should not be fed green until the crop is matured, that is when the flowering stage is reached. If the crop becomes stunted with drought, or frosted, it is also dangerous to feed green; in this case it should be cut and dried or made into ensilage. Matured Sorghum can be fed without any risk.

For ensilage, experience shows that Sorghum should be fairly mature before cutting. The stalks may look rather dry, but Sorghums should not be cut for silage until the seeds are hard. If cut too early the silage is apt to be acrid and inferior to that cut at the right time.



The earliest sowing of Sorghums should be made directly the frosts are over, and the second crop may be planted up to the end of January, November and December being the best months.

In rich, moist land, and where fineness is desired, up to fifty pounds can be sown broadcast per acre, but in ordinary situations thirty pounds is ample; it is a good method in such land to sow in drills three feet apart, and keep the land between the rows cultivated. In drills, about ten pounds per acre is sufficient. Prices vary with the market.



Sorghum, Saccharatum or Black Sorghum—The hardiest, recommended for cold districts where the season is short.

Early Amber Cane—The earliest and the best variety to withstand droughty conditions. Largely used on the irrigation areas, as less water is required to bring it to maturity.

Planter's Friend—For late crop, as it stands cold weather and retains its sweetness and feeding qualities even after the seed is matured.

Sacaline (The Ideal Late Sorghum)—Exceptionally rich in sugar, it is very palatable and fattening to all classes of stock, while its succulence and freedom from "pithiness" after standing through severe winter is most marked.

One of the very valuable habits of Sacaline is its persistent ratooning or throwing up of new growths from the roots when the matured stalks have been cut. It has in several instances stood through the winter, and then when all cut thrown up a fresh crop of fine stalks the following spring, and grown well through the second summer.

GRAIN SORGHUM

"The Summer Growing Grain Crop for Inland Farmers."

In districts where the average rainfall is too limited for the regular growing of Maize, Grain Sorghum will soon be recognised as worthy of inclusion in all crop rotations. It has these characteristics:—(1) It will thrive on a lower rainfall than Maize. (2) The grain has a feeding value nearly as great as Maize. (3) The weight of grain produced is good, under fair conditions up to 40 or even 50 bushels per acre may be obtained. (4) It will succeed in soils too poor for Maize and it seems to be more or less resistant to alkali in the soil. (5) It can be used for fodder or for ensilage when the seed is in the "dough" stage. (6) Even when the seed has been harvested the foliage and upper stems are of value for the stock as roughage. (7) Unlike other Sorghums it is non-saccharine.

Feeding as Grain—When ripe the heads can be harvested and thrashed or they may be fed straight to the stock. If possible it is an advantage to crush the grain or if desired the whole head can be ground without thrashing.

Green Fodder and Silage—For these purposes the plant must be left until the seed is in head (say in the "dough" stage), when there is practically no danger of Sorghum poisoning, so long as there is no young growth showing. Silage made from Grain Sorghum is of considerable fodder value and will be worth many times its cost in a dry time.

Sowing—After the frosts are over the earlier the seed is sown the better. We recommend sowing thinly in drills 3 ft. apart and the rate per acre should be 6 lbs. to 8 lbs. for fair rainfall districts and 4 lbs. to 6 lbs. for areas of light rainfall. Large paddocks can be sown with the wheat drill if a little care be taken to make the necessary adjustments. When the seed is up give the same cultivation as for corn. If possible give the land up to 1 cwt. superphosphate per acre.

VARIETIES

WHITE YOLO—This is a new variety which has just been sent out in America. It is, apparently, the result of selection after cross hybridisation between Feterita and Milo. Our supplies are N.S.W. grown from seed especially imported from U.S.A. Dept. of Agriculture. Its main characteristics are dwarf habit, and uniformity of height, thus making it easy to harvest by machinery.

It is attracting considerable attention in America and we quote the following from an article by a Californian agricultural authority:—"Last season 1,047 plants were measured from field run. The height ranged from 33 to 56 inches, but 90.3 per cent. of them ranged from 40 to 51 inches, and 53.7 per cent. of them were from 44 to 49 inches. With this low stature and uniform height the whole crop was cut and threshed from the field with a small Combine. A number of other machines were also tried with success.

Ordinarily, it cost about 10 dollars per acre to put the grain of Milo or Feterita in the sack, but by harvesting Yolo with machinery the cost was about three dollars. It was found also that the small amount of neck that had to be cut in order to get the entire crop was an advantage in threshing, for it gave the cylinders a certain amount of straw which prevented breaking the grain.

Yolo is a little later than Milo, and in some instances does not yield so heavily, but growers have stated that the ease and rapidity of harvest with the consequent absence of bird damage is a decided advantage. The heads of Yolo ripen somewhat earlier than the leaves and stalks, hence, under conditions, when no poison has developed, the pasturage is valuable for sheep and cattle."

FETERITA—Fairly early and makes heavy growth.

MILO—Very drought resistant and makes thick succulent growth.



YATES' RELIABLE SEEDS—ALWAYS THE BEST

From a Wholesale Customer in South Australia.

2/7/24

My clients are well awake to the fact and they realise that it pays well only to sow the best class of Seeds, viz.; A.Y. Re-Machined Giant Upright Broad Leaf Lucerne Seed, in fact, 6 lbs. of this class of Seed that we are receiving from you goes quite as far as 7 to 8 lb. of Seed sold as Hunter River.

MILLETS

Quick, Cheaply-Grown Summer Fodder Crops.

AS a catch crop to augment the natural grazing many farmers require a quick-growing fodder to give a "green pick" when the pastures are ripened and dry. The need is for something that will require little labor in cultivation or harvesting. Some of the MILLETS are eminently suited for this purpose. They will grow well on even mediocre land and

several of the varieties stand grazing very satisfactory, and shoot again and again.

As a "follow on" for milking cows and growing lambs, after the spring grass has commenced to dry, the several varieties of MILLETS specially indicated are excellent. Sow broadcast or through an ordinary grain drill set for suitable depth, as mentioned below.

Varieties and Their Uses.

Japanese Millet, for grazing purposes or green fodder, gives the earliest growth. This variety is of upright growth and stools out fairly well. It grows up to 3 feet 6 inches or more high and "comes again" very quickly after being fed off or cut; also makes excellent hay.

White French is smoother and of slightly more succulent foliage, and grows up a little higher, but does not stool quite so well. This millet also recovers very quickly after feeding off or cutting.

Siberian Millet, while not coming quite so quickly in the first instance as the two previously mentioned, stools very thickly after being fed off, and gives a splendid second and even third yield of greenstuff. Siberian Millet will produce its secondary growth even while the first growth is ripening. Supplies uncertain.

Hungarian Millet, another very valuable Summer green crop, Sown in the spring or early summer it will give a wonderful heavy crop of hay or ensilage. For hay purposes the Hungarian Millet is much superior to other varieties. It is a quick grower; in fact, in suitable situations, if the seed is sown in September, it will mature early enough to obtain a second crop of hay off the same land. Twelve pounds of seed per acre in drills, or 20 pounds broadcast is a fair sowing. When in bloom it should be cut and treated as other hay.

Broom Millet.—The grain is an excellent fowl feed, but the great value of this variety is for broom making. We stock the best Hunter River Grown Long Hurl variety.



MILLET TRIALS AT EXETER

FOR PRICES SEE CURRENT PRICE LIST—POST FREE

SUDAN GRASS

THE WONDER CROP

Fodder reserves in many districts are exhausted. The quickest and a most satisfactory way to augment supplies is to sow Sudan Grass—one of the very best hay crops. It is a prolific yielder and of excellent nutritive value, and one of the most drought-resisting plants we have.

As a summer crop, Sudan Grass has come into striking prominence during the past few years. We believe that this grass is destined to take a very high place among our summer fodder crops. Though not so heavy a yielder in its primary growth as some of the Millets, after the first crop is taken off, Sudan Grass stools thickly and comes again and again in a miraculous manner. The rapidity of growth and weight of crop of the second, third, fourth, and in some cases fifth, cuts surpasses anything else among the summer fodders.

Sudan Grass requires a good seed bed and a certain amount of moisture in the soil, to germinate quickly and evenly, but, once established, it has proved itself to be of great drought resistance, in fact, it can be accepted that Sudan and Grain Sorghum are the only summer fodder crops that will give consistently good results in the western districts of N.S.W. Its palatability, green, or in the form of hay, is indicated by the greedy manner in which all classes of stock eat Sudan Grass. Its fodder value, tested under chemical analysis, is stated to compare most favorably with wheaten or lucerne hay. Sudan Grass stands grazing extremely well, and it is probably the most valuable of the summer-growing fodder crops for this purpose.

A member of the Sorghum family, Sudan Grass is an annual and must be sown down each year. It is most sensitive to frosts, and should not be sown until all danger of such is over, and then as early as possible, so as to ensure a good growth and a strong stand by midsummer. Prepare the land as in the cultivation of wheat or sorghum. Sow either in drills or broadcast. If in drills, about eighteen inches to two feet apart, sow 6lbs. to 8lbs. to the acre. This allows of cultivation between the young plants, assisting materially in helping on the young growth by conserving the moisture and checking the weeds. For the man sowing a large area probably the most practical method of sowing this crop would be through the ordinary grain drill—perhaps alternate hoes, at 8lbs. to 12lbs. per acre—or failing that, broadcast, at the rate of 12lbs. to 16lbs. per acre. Its value as a grazing crop is very high but will be enhanced by growing with Cow Peas or Soy Beans where the climatic conditions permit.

As will be readily understood in such a quick growing and vigorous plant, Sudan Grass responds very noticeably to fertilisers. An application of from 1cwt. to 2cwt. of superphosphate with the seed is strongly recommended.

Order early—sow as soon as frosts are over to get a long growing season

FOR PRICES SEE CURRENT PRICE LIST POST FREE.



ROTATION OF CROPS

ENSURING SOIL FERTILITY AND SUSTAINED PRODUCTION

WITH the development and wider adoption of mixed farming the question of Crop Rotation is of more general interest than hitherto, when its importance did not receive due recognition from Australian farmers.

The main purpose of Crop Rotation is to maintain fertility of the soil, to check plant diseases, to control weed growth, and to conserve moisture in the soil.

Crop Rotation assists in maintaining fertility, as it is usual to include a legume, which increases the available nitrogen in the soil, and then many of the crops are grazed and the animal manure is thus deposited on the soil, and also the change over from one crop to that of a different nature allows the soil to "recover."

Crop Rotation checks plant diseases because when the same crop is grown continuously on the same land, diseases and insect pests which are special to that crop, tend to increase rapidly and to make it practically impossible to grow a healthy crop, and this tendency to disease is undoubtedly helped by the lack of vigor in the crop resulting from depleted soil fertility, as set out above. On the other hand, when a crop of a different nature intervenes, most of these pests are checked and are unable to make any headway in the absence of the "host" plant.

Crop Rotation keeps down weed growth. The reason for this is that the different crops are grown under dissimilar conditions, some broadcast and some in cultivated rows, and the various crops are planted at different seasons, therefore all classes of weed growth are discouraged and the ordinary tillage and grazing cleans the land without extra labour.

Crop Rotation conserves moisture by adding humus to the land and thus making the soil more water retentive; and the greater cultivation minimises the loss by evaporation.

The succession of crops most suitable will vary considerably for each district and for each class of farming carried on. On the

coast and tablelands rotations can be devised to include various kinds of cereals, root crops, legumes, summer fodder crops and pastures; in good wheat country the crops likely to be of most assistance are cereals, winter legumes, rape, summer fodders, like Sudan and grain sorghums (with cultivation), and natural grazing, while in the low rainfall areas wheat and bare fallow have been found, up to the present, the only practicable rotation, but even here it is probable that the inclusion at regular intervals of a legume, which can be grazed with sheep, will prove profitable.

The main principles of rotation are that the soil should not grow the same crop, or class of crop, two years in succession; that a nitrogen gathering crop should follow a nitrogen consuming crop, and that a cultivated crop should precede a broadcast or closely drilled crop, especially where the latter is a cereal; and these principles should be used as a guide and adopted where possible.

Crop Rotation encourages mixed farming and vice versa, and we feel sure that this interplay of forces is all to the advantage of the farmer.

Mixed farming and crop rotation require that more stock be kept on the farm than is usual in many districts, and this is very desirable where land is to be continuously cropped and yet kept fertile and in a good physical condition. For example, the introduction of sheep on to the wheat farm has increased the production of the farm and greatly minimised the risk of total loss in a dry year, which will always beset the "one crop" man.

It is not always realised how readily the manurial and humus contents of the soil may be replenished and increased by sowing a leguminous crop, or combination legume-cereal crop, and grazing this with sheep. The animals' droppings and the roots, stems and unconsumed portion of the crop, all add immensely to the fertility of the soil, but in addition (and this is of even more importance) the texture of the soil is improved and the capacity for retaining moisture greatly increased; that is the great advantage of animal manure over artificial fertilisers.

Crop rotation and green manuring are of proved value and the more thoroughly crop rotation is practised the higher is the standard of agriculture attained.

BOKHARA CLOVER (or White Sweet Clover)

Melilotus alba

This is a clover with a big reputation for renovating land for green manuring and for preparing land for the introduction of lucerne. The plant makes very big root growth and, being a biennial, the plant dies out after the second year and the big root growth rots down very quickly.

Bokhara can be grazed profitably by all classes of stock, the fodder value, by analysis, being extremely high. There is practically no danger of bloat with this clover and it is a great milk producer. It is also an excellent honey plant.

If used as a rotation crop it can be ploughed in either the first or second year according to circumstances. Seeding does not take place until the second year and so long as this is prevented there is no danger of the plant getting out of control.

This plant should not be grown in wheat paddocks. Sow 8 lbs. to 10 lbs. per acre broadcast, or 5 lbs. in drills.



YATES' Re-cleaned SEED GRAIN

IN SEALED AND BRANDED BAGS.

THE importance of sowing only Re-cleaned and Re-graded Seed Oats and Seed Wheat for green fodder as well as for grain is now beyond the experimental stage. The high cost of labor and high land values make it more than ever necessary to get the most out of the cultivated land. It is better to have ten acres of a really good crop than twice the area giving only an indifferent yield.

SEED OATS.

Prime Heavy Re-cleaned Samples.

We have proved at our experimental farm at Exeter that the most profitable method of feeding dairy cows for eight months of the year is to plant **Algerian Oats** for grazing. To get the best results the cultivation land should be divided into three or four small paddocks; the crop which has been eaten down soon recovers after a few weeks' spell, but continual grazing is wasteful, not good for the crop or the cows. We recommend that a dressing of 1 cwt. of Bonedust or Superphosphate be used, also five or six pounds of Clover seed per acre be planted with the Oats. This will give a more balanced ration and so increase the milk flow; it will also make the land increasingly fertile, and give a good stubble-feeding during the following autumn.

We have found Algerian Oats to be by far the best variety for grazing; being of finer growth it stands a good deal of trampling and its spreading habit and strong root growth prevent it from being easily pulled out. If shut up in the early spring a crop of hay may be harvested in addition.

For cutting purposes some of the vigorous-growing early Oats like Ruakura, Sunrise, etc., may prove superior in the milder climates; these are tall-growing and have fleshy stems, and come very quickly; in fact, they grow almost as quickly as Barley and are superior to it for feeding value. They will however not stand extremes of frost like the Algerians, and, on account of their coarse fleshy growth, do not stand trampling and hard grazing so well.

For late sowing in the cold districts the Tartarian and heavy varieties are preferred.

VARIETIES.

Mulga, Sunrise Guyra, Ruakura, White Tartarian, Algerian, Black Tartarian, Heavy White, Heavy Black, Dun

BARLEY.

Barley is one of the sweetest fodders, and is relished by all stock. **Cape Barley** is the one most generally used for green fodder; it grows very quickly, but as it is not so hardy as other grain, it is most suitable for early use in cold climates. **Skinless** is also a good variety, coming very early to maturity, and affording two cuttings; it should be grazed after each cutting; the close feeding seems to cause it to come again with renewed vigor. Both are excellent for ensilage. **English Barley** is also sown for the grain. Sow about two bushels to the acre.

Mr. N. A. M., Bendolba, Via Dungog. 13/2/24
I purchased some of your Ruakura Oats last season, and I had a wonderful crop. It was the best lot of seed I ever handled.

SEED WHEATS

Prime, Heavily Re-cleaned Samples. Grown from Select Stocks.

A large proportion of our seed wheat supplies has been specially grown for us by Yates Bros. Ltd., Cudal, from specially re-graded seed of selected stocks.

Wheat is largely used for green fodder and for hay as well as being the world's most important grain crop. It stands dry conditions better than almost any other grain and is therefore of great value for fodder and for hay, as well as for grain in districts of low rainfall. It will often give good crops in seasons which cause oats to be a failure.

Following we give a list of varieties which we offer this season, but as supplies of some varieties are somewhat limited, early enquiries are invited. The advantages of sowing only whole plump grain free of pinched broken seeds, weed seeds and foreign matter, is now proved to be worth many, many times the slight extra cost per acre for Re-cleaned Seed; in unfavorable seasons it may mean the difference between a crop and a failure.

Thew and Florence are of special value for green fodder under coastal conditions.

Sow up to 2 bushels per acre together with a dressing of 56 lbs. to 112 lbs. superphosphate per acre, according to location and quality of the land.

VARIETIES.

Florence, Thew, Canberra, Federation, Hard Federation, Marshall's No. 3, Yandilla King.

RYE CORN (Mammoth White)

Rye is a very hardy plant, and is largely used for winter feed, especially where the climate is severe; it will stand the heaviest frost. It is particularly good when fed off; many experienced farmers preferring to use it this way, as they find their stock do best while the Rye is young.

It will stand grazing all the winter, and rapidly grows again after being eaten down. It is also used for mixing with Tares, the Rye serving to hold the Tares off the ground, Rye comes into use very early. It is also sown to advantage mixed with Rape. The straw is very valuable for thatching, and some farmers sow the headlands of their hay paddocks with Rye Corn for thatching the stacks. Sow about two bushels to the acre.

Mr. W. J. L., Killara, Crookwell. 27/5/24
The whole of the previous consignment of Grasses and Clovers opened up to our entire satisfaction. I have no hesitation in recommending your firm to all my neighbours and friends. I do not think it would be possible to buy purer or cleaner Seed anywhere.

Yates' DWARF ESSEX A.Y. BROAD-LEAF

Sowing Rape

Sowing Rape is the most profitable of all annual sheep fodders.

Sowing Rape is the best change or rotation crop for the wheat farm.

Sowing Rape is very valuable as a soil renovator.

Yates' Dwarf Broadleaf is the best and most vigorous strain, and every line heavily re-cleaned and tested, and sold in sealed and branded bags.

Write for current quotations.

RAPE is the great fodder plant for sheep husbandry in Australia, and with the widespread recognition of the value of combining sheep and wheat, Rape is now becoming a very important crop on the wheat farm, not only for sheep feed, but also a rotation crop and for renovating wheat land. The cost of the seed is so little, and the cultivation so simple, that it cannot fail to be much more largely used.

If paddocks, which are showing signs of exhaustion under wheat, are ploughed, and a crop of Rape sown, say early in March, it will give an enormous quantity of sheep feed during the winter and following spring, which will fatten ten or twelve sheep to the acre for some months; and if during the following summer, the remains of the crop and sheep droppings are ploughed in, the land will be very much enriched, and if sown with wheat again, a greatly increased yield will result. It is easy to see how profitable it is to utilise the land in this way. Even if, owing to unfavorable seasons, the crop of Rape comes to nothing, there is very little lost, as the cost of seed is so little. Rape is equally good for pig feeding or even cattle, so long as it is not given in quantity to milking cows, as it is apt to taste the milk.

Where large breadths of land are not available, there are often paddocks about a homestead which will give enormous yields of fodder if sown with Rape, and which would be particularly valuable for feeding stock during the scarce season; they all eat it greedily.

Sheep put on to Rape fatten very quickly; even old broken mouthed ewes, that would starve on an ordinary pasture, very soon put on flesh, and

are fit for the butcher. They should, however, be sent to market as soon as they are "topped off," as if put back on to grass they very soon lose condition again. As a means of fattening lambs for the English market, there is nothing to equal Rape; they are soon in the pink of condition as required for the export trade, and if there are two or three paddocks of Rape, so that as soon as eaten down, each paddock can be "spelled" the plants soon recover and give a second or third crop almost as good as the first; in fact, if sown in the early autumn it should give several months' feed.

Poultry farmers are finding a small patch of Rape a valuable asset, and for this purpose small successional sowings should be made through the autumn and again in the spring.

Some growers prefer to sow it with Rye Corn, say half-bushel of Rye and two pounds of Rape; others sow it with Mustard, using half-a-pound with four pounds of Rape per acre. The inclusion of Mustard corrects the tendency of Rape to sometimes scour.

We recommend sowing in February, March or April, after the good autumn rains, but as early as possible after the middle of February. It can also be sown with advantage in the early spring, especially in the cooler districts. It is extremely hardy. The land should be deeply ploughed and well worked; but if sown on stubble land, it would be enough on light soils to thoroughly stir the surface with a disc harrow; but ploughing and harrowing would be much better still. Sow three pounds per acre in drills, or four to six pounds broadcast (if drilled, so much the better). Where a machine is not available it may be sown broadcast by mixing with several times its bulk of dry soil, which will materially help to distribute the seed evenly; or it may be evenly distributed with a Cahoon or Columbia Broadcast Seed Sower. We can

supply these useful little implements—price on application. We do not recommend that Rape should be sown on poor hungry land, as it will not succeed; it requires good soil and deep cultivation, and will well repay the labor expended in preparing the land thoroughly. Where manure is employed in growing Rape (and it is a crop which quickly responds to such attention) we would recommend one rich in ammonia, say blood manure or fine bonedust; superphosphate is also used with great success.

As there are several varieties of Rape, some very much better and yielding larger crops than others, also, as many of the cheapest samples are tainted with wild mustard or yellow weed, we would strongly advise growers to buy our re-cleaned seed, and note that each bag is sealed and branded.



Sundry Fodder Crops

Burnet (Sheeps).—This fodder plant has proved itself suitable for our dry inland country, where it would be futile to sow English grasses, and where the soil is not suitable for growing Lucerne. It thrives alike in rich or poor land, and on either flats or hills; it gives great results in the undulating land about Wagga, where neither Lucerne or Rape will succeed. It is one of our best drought-resisting plants, and remains green when every other fodder is burnt up, springing again with light showers that would have not the slightest effect on the grass; it is absolutely permanent, and, when once established does not die out. It is a herb, not a grass, grows from fifteen to eighteen inches high, and has a long tap root, which enables it to stand dry weather and grow when other plants, with shallower roots, are drought-stricken. It grows both in summer and winter, giving the greatest rush of feed in the spring. All animals are fond of it, and thrive well on it, but it is particularly suitable for sheep. Sow ten to twelve pounds per acre. Burnet may, with advantage, be included in Grass Seed Mixtures for poor soils; being a deep rooter it does not rob the surface-rooting grasses, and succeeds where better grasses fail.

Sunflower.—Valuable, when growing, as shelter to young crops, and the seed forms a most excellent food for poultry and in fact all stock. In U.S.A. it is now being used quite a lot for ensilage; it has been found of considerable value for this purpose. Sow about 12 lbs. per acre in rows three feet apart.. (Black Seeded or Striped).

Artichokes (Jerusalem).—These are similar to Potatoes, and require the same cultivation, but we would plant in rows two or three feet apart. A most desirable and delicate vegetable. They yield very heavy crops and are excellent for pig feeding, especially where pigs can be turned in to root them out; their fattening value is 25 per cent greater than potatoes. Four to six cwt. will plant an acre.

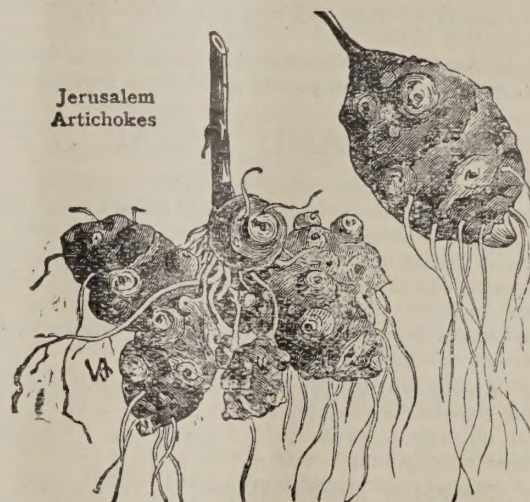
Buckwheat (Japanese)—A splendid quick yielding fodder crop and valuable for fowls. Japanese are the largest and most vigorous varieties. Sow 20 pounds per acre.

Canary Seed.—So largely grown for bird seed. It may also be used for hay purposes, requires similar culture to wheat; sow 17 to 20lbs. per acre. Queensland grown seed, and extra large seed, Morocco grown.

Linseed (N.Z. Grown).—This is grown either for seed, for oil purposes, or for the fibre for linen making, but requires special conditions, which intending planters should inquire into if putting in large areas.

Melons, Cattle.—A mixture of suitable sorts. Generally the Cattle Pumpkins are to be preferred, but the Melons form a juicy-stand-by-fodder

Mustard.—For a quick green fodder for fattening lambs, Mustard can be recommended. Sow eight pounds per acre. It is also frequently mixed with Rape. It is ready a few weeks after sowing.



Jerusalem
Artichokes

Pumpkin, Cattle.—The Pumpkin crop is invaluable for winter feed for milking cows and young calves; 1lb. will sow an acre.

MAMMOTH CATTLE.—Very large, heavy cropper.

GRAMMA.—A long shaped variety, big yielder.

MIXED CATTLE.—Including types of Ironbark and similar varieties, excellent for productiveness and keeping quality.

Silver Beet.—This plant is grown for the green tops, not for the roots, as with other Beets. It is found in New Zealand that the foliage is reproduced so quickly after being eaten down, that it makes an excellent crop for sheep fattening. Plant in rows, thirty inches apart, so that the land can be hoed, and thin from nine to twelve inches apart in the rows. Sow three or four pounds per acre.

Teosinte.—As this has been largely superseded by other crops and as we have little or no demand we have discontinued stocking.



MIXED
CATTLE PUMPKIN

ROOT CROPS

THESE are worthy of greater attention from Australian farmers. Here we have valuable food in a concentrated and easily handled form. The weight of fodder per acre to be realised from root crops is enormous.

The quality of the fodder is very high and where any hand feeding is practised it is not a difficult matter to feed the roots. In Australian climates Mangolds, Sugar Beets and Carrots will stand fairly well in the ground right through the winter, and they can be pulled and fed as required.

MANGOLDS AND SUGAR BEET

Wonderful milk producers, and yield immense crops. Sow about September-October; in warm climates an autumn sowing will give a fine crop. Plant in well worked clean land, in drills 30 inches apart, to allow horse cultivator to work and when up hoe to remove any growth of weeds, and if necessary to thin out to allow the roots to develop. Five pounds per acre of Mangolds and about eight pounds per acre of Sugar Beet are fair sowings.

Yates' Mammoth Long Red—A very select stock. The roots are of excellent quality, clean, smooth and free from fangs; flesh close grained and full of saccharine. The heaviest cropping Mangold grown.

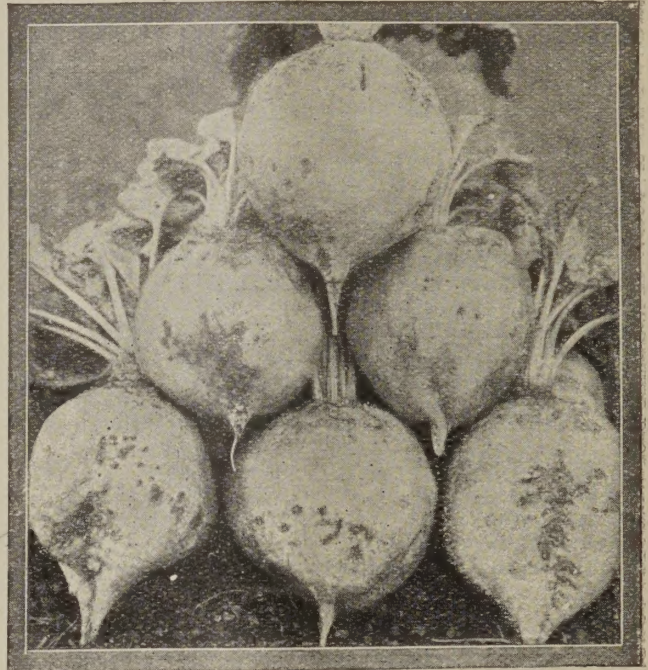
Yates' Champion Yellow Globe—A very select stock, small top; flesh close in texture, excellent feeding quality.

Golden Tankard—An excellent keeper. The roots medium size, with deep yellow flesh, and contain high percentage of saccharine.

Long Yellow—An excellent variety, very heavy cropper.

Sugar Beet Wanzleben—Half long white roots, sweet and crisp.

Giant Half Sugar Mangold—We keep the two varieties, White and Rose. They are sweeter than the ordinary Mangold and larger than Sugar Beet, combining the quality of the Beet with the weight of crop of the Mangold. Tested against Sugar Beet it yielded twice the crop. Intermediate in size, averaging about one foot in length.



Yellow Globe Mangold

FIELD CARROT

Valuable for all classes of stock, particularly horses. Sow any time in spring or early summer, when the weather is favorable, at the rate of four pounds per acre in drills 30 inches apart for horse work or closer if for hand work.

White Belgian—Grows well out of the ground, so it can easily be pulled by hand.

Orange Giant—A rich orange red variety, very handsome and smooth, producing large crops.



SWEDE TURNIPS

Swedes can be grown cheaply and with comparative ease on much of the upland country of N. S. W. not only for stock but for the vegetable market. For sheep they make an excellent fodder especially as they become available during the winter and early spring when most needed. Sowing should be made in February, March and April at the rate of two to three pounds per acre in drills about two feet six inches apart. Up to one hundred weight of superphosphate will cause considerable increase in weight and vigor of crop.

VARIETIES

YATES' CHAMPION PURPLE TOP—A standard globe-shaped variety, which gives wonderful returns and is the standard sort for growing for market. Our strains are unexcelled, the crop comes in evenly and the Swedes are well shaped, large and keep well.

YATES' MONARCH—A large tankard-shaped variety, with purple top. Heavy yielder and a good keeper. Excellent for stock or market growing.

Australian Saltbush

THE PLANT THAT MAKES FODDER WHEN FEED IS MOST NEEDED.

The cultivation and preservation of our native Saltbush has been very much neglected. Its drought resistance and ability to thrive in the most arid situations is proverbial, and the different members of this important family succeed in a very wide variety of soils. In our inland districts it will be found that areas put under Saltbush at little cost will help very considerably to tide over the long dry spells. The value of the Saltbush has spread abroad and large areas of "useless" country in U.S.A. have now been reclaimed with this plant. Although not sought after by stock when grass and herbage are available, Saltbush is readily eaten in times of scarcity, when it is most needed, and chemical analysis has shown that the nutritive content is high. Once established they grow quickly and with reasonable protection seed freely. Mr. Fred. Turner in his book "Australian Grasses and Pasture Plants," is a strong advocate of the more extensive use of this plant. Speaking of *Atriplex nummularia* he writes:—"During my extensive travels in Australia, describing the indigenous and acclimatised vegetation, I have seen several disastrous grass fires in the interior. Where Saltbush was fairly abundant the effects of the fires were not nearly as disastrous as where this valuable vegetation was scarce, or had been eaten out by stock. The succulent leaves of the Saltbush were only slightly scorched after the fire had passed over the country, and the growth afforded great protection to the more delicate grasses and herbs, which soon begin to grow again if the weather and soil conditions are favorable. It was after making these observations that I advocated the planting of the Old Man Saltbush as a firebreak, for it is easily cultivated and grows rapidly. A plantation a chain wide or more, and as long as desired, could be formed between two parallel stock-proof fences at comparatively little expense. Such a plantation would answer the double purpose of affording excellent feed for cattle and sheep (the upper growth being judiciously cut for this purpose)

and providing a dense growth that would arrest the progress of the fiercest bush fire that menaced homestead and crops. It is not necessary to plough or otherwise work all the land between the fences for the reception of the seeds. All that is required is to pulverise the soil in patches, eighteen inches square, and one foot deep, at intervals of from eight to ten feet, with a strong hand hoe, and thus form a good seed bed, which should be slightly concave on the surface. In the centre of each depression sow half a dozen seeds, preferably in early spring, and leave them covered with about half an inch of fine, light soil. The only attention that is necessary is to keep the weeds and grass in subjection about the young plants after which they will take care of themselves. Under ordinary conditions Saltbush raised in this way will have grown from four to five feet high by autumn."

Saltbush is not difficult to raise from seed or cuttings, or roots. Seed should be sown in the autumn or early winter, either direct or in a nursery bed and later transplanted.

The Dept. of Agriculture recommends that the plants be raised in nursery beds and transplanted when about twelve inches high.

We think that greater consideration than hitherto might well be given this plant by graziers in our western slopes and plains country. One pound should seed about an acre.

VARIETIES

The two varieties of greatest value are:—

Atriplex nummularia (Old Man Saltbush)—Grows to six or ten feet or more with numerous spreading branches carrying thick succulent foliage. Very hardy.

Atriplex semibaccata (Creeping Saltbush)—A creeping variety especially suited for sheep country. Under cultivation it has shown very rapid growth.

Edible Trees and Shrubs

KURRAJONG (*Sterculia diversifolia*)—A tree that combines palatability and a relatively high nutritive value as a fodder, with ability to grow in almost any part of our pastoral country, and great use for shelter and a fine appearance, surely deserves to be widely planted. What finer investment for the pastoralist than plantations of this beautiful tree. Although slow growing at first, it will in a few years form a very shapely tree, and the rate of growth will probably be accelerated with a little judicious cultivation round the tree. The chemical analysis of the foliage is very good and after any long dry spell the lopped trees one sees everywhere is the best testimony to its value. The more care that is exercised when lopping, to take only the finer branches, the quicker the tree will recover.

Seed should be sown from autumn on to early spring and usually germinates readily. The seedlings must of course be given protection if planted in the paddocks, but growth will probably be quicker if they can be put out in blocks and fenced off and the ground worked now and again.

TAGOSTASTE (so-called "Tree Lucerne")—A quick growing shrub or dwarf tree. It makes excellent shelter round the fences of paddocks, and in periods of drought and scarcity would make an excellent stand-by for feeding. We do not value it very highly as a fodder, but used as above it is well worth growing. It is also unequalled as a breakwind round an orchard or garden. Having a deep tap root it does not rob the surrounding land as other trees do; in fact, crops can be successfully grown close up to them. In its flowering season it gives a great harvest to the bees. The plants are easily raised from seed, which should be soaked in warm water before planting. It is best to sow the seed where they are to grow, afterwards thinning them to proper distances apart.

TREE LUCERNE (*Medicago Arborea*)—The true Tree Lucerne, growing six feet or so. Pretty ornamental plant, and useful for fodder in drought times.

It is also claimed to be of value as a honey plant.

The Conservation of Fodder

"An Insurance Against Drought."

THIS, the greatest need of the man on the land, is often lightly advocated by the "theorist."

It is not so easy of accomplishment as, to the inexperienced, it appears at first sight. Labor is often scarce and dear and the weather is not always what it should be. But the desired end can be obtained at reasonable cost by choosing the right crops and treating them in the proper manner.

ENSILAGE—This is the best form of conserving fodder, as the natural juices of the plant are retained and the digestibility of the fodder thereby increased, and this is of great importance and the milk production is kept up and the health of the stock maintained.

On those farms operating a silo in one form or another a large amount of growth can be saved which, owing to its nature or to weather conditions, cannot be harvested in any other form.

Ensilage is green succulent fodder preserved by the exclusion of air and limited fermentation in approximately the same condition as when cut. When carefully stored it will keep almost indefinitely and (except in the stack system) there is very little waste.

Ensilage can be made in stacks, in built-up tub silos, or in pit or hill-side silos. The stack system is not recommended, except in emergency, on account of the waste, but the other two methods are both very satisfactory.

For information regarding the construction of these, readers should refer to the valuable bulletins on this subject, or "The Farmer's Handbook," 10/6 (postage 8d.)

Any green succulent crop can be made into silage, but those usually grown for this purpose are Maize and Sorghum, the Maize when the cobs are glazed, and the Sorghums when the plants are fairly mature—that is when the seed head is full of well-colored seeds. Other crops that can be used with advantage are Sudan Grass, Sunflower and most of the Legumes, particularly Cow Peas. **The Legumes add considerably to the value of the silage** when grown in conjunction with Maize, Sorghums, or Sudan.

Fodder Conservation rather implies the saving of growth which is produced over and above the ordinary requirements of the year, and in this connection we would specially recommend the saving of the first Lucerne cut (which is usually rather dirty) and in lush seasons, and where possible, the natural growth of Trefoils, Herbage, Variegated Thistles, etc. For this purpose pit silos are suggested, as the tub silo (if any) will probably already be in use.

Silage thus saved in pits will if properly made be worth many times its cost sooner or later.

HAY—Where this is regularly grown it is wise to erect a small extra stack each year to be looked on as a **reserve**; in the course of a few years this method will provide, at little extra cost per year, a standby which in a dry year will mean a big profit and may be the means of preventing disaster.

The small landholder does not always realise that splendid hay can be made from other crops beside Oats and Wheat. Many a farmer regards Lucerne as quite out of his line. He has never tried to grow it, nor have his neighbours; and perhaps a false tradition has grown up that his is not a district suitable for Lucerne. In our remarks on Lucerne in this booklet we have endeavoured to show its remarkable adaptability to varying soils and climates. The value of Lucerne as a hay crop calls for no comment. Several of the Millets also make first rate Hay for saving in the late summer and autumn. For particulars of the varieties turn to the page on Millets. Sudan Grass is a truly remarkable yielder of magnificent Hay. This wonderful crop will yield results under extremely adverse circumstances, and in a good season will give an astounding return in several cuts through the summer and autumn. Turn to our pages on Sudan Grass.

Some of the Clovers make a very valuable and nutritious Hay, which stock are extremely fond of. Field Peas, though difficult to cut with an ordinary mower, without a special attachment, make a good, easily cured hay for home use.

Following are approximately the correct stages to cut for Hay.

Lucerne—Just after the first flowers have appeared.

Millets—When the majority of the heads have reached the milky stage, not later

Sudan Grass—After the rush of bloom is over, and before the seed hardens.

Clovers—When in full flower, but before flowers commence to wither.

Field Peas, Soy Beans, etc.—When pods have just set.

Native Grasses—About flowering time.



YATES' HAND PICKED SEED POTATOES

THE SEED POTATOES offered in this list are all prime, graded samples carefully hand picked, outsized and diseased tubers being thrown out. The bags we send out are all stencilled "YATES' HAND-PICKED SEED POTATOES," and customers should see that the bags they get are so branded, otherwise they were not sent by us. It is quite impossible to guarantee Seed Potatoes to be free from the spores of Irish Blight, and the crop should be regularly sprayed where Blight conditions are prevalent.

Potatoes should be planted for early use as soon as the frosts are over. A few may be planted rather earlier as it is worth running some risk to get early Potatoes. Open drills about 30 inches apart and six inches deep. If possible, put in this drill a layer of well rotted stable manure; a dressing of some potash manure is also very beneficial. Potatoes up to two or two-and-a-half inches should be planted whole, those larger may be cut, care being taken to leave two eyes at least on each set. Plant the tubers about twelve inches apart in the rows. As soon as through the ground, keep the soil cultivated and when plants are about six inches high they should be earthed up by throwing the soil towards the rows.

DESCRIPTIVE LIST OF VARIETIES

EARLY MANISTEE—This has proved perhaps the best of the Early Varieties. It has a pink-brown skin, is of fine flavor and boils dry. One of the heaviest croppers in the early section. It is yearly becoming increasingly popular and has been found a suitable variety for light land.

EARLY ROSE—Well known as one of the Earliest Potatoes grown, and one of the best for early use if grown on suitable well-drained land. A good boiling variety, but its principal merit is its earliness and its suitability for our warmer districts where there is only a short growing season, and where it always yields fair crops.

EXTRA EARLY VERMONT—Very similar to the Early Rose, the tubers being longer, not so smooth, and with more prominent eyes; good cropper, and quite as early as that variety. Often called American Early Rose.

BEAUTY OF HEBRON—A good variety for hot, dry climates, similar in shape and earliness to Early Rose, but lighter in color.

EARLY MANHATTAN—One of the heaviest yielding main crop varieties we have. A good cooking sort, firm white flesh, shallow eyes, and mottled blue and white skin. A handsome shapely potato, well suited to the Sydney market.

SATISFACTION—A pink skinned round variety, largely used in our coastal districts. It is one of the best keepers. Flesh white, boils dry, shallow eye.

ADIRONDACK—Main crop. One of the best keepers we have. The tubers are round, inclining to flat, with pink netted skin. They boil well and will give good crops in a suitable season, and in cool moist climates, where they have a long growing season, they are good croppers.

BROWNELL'S BEAUTY—A favorite main crop potato in New South Wales. It is a consistent cropper, and seems to do well alike in both hot and cold districts.

FREEMAN—After the type of Brownell's Beauty. Light pink skin, white flesh, flat-oval in shape.

CARMAN—Good Late Variety. Heavy cropper, large handsome tubers, shallow eyes, uniform in size and shape, and boiling flowery.

FACTOR—A variety which is gaining favor as a late variety. The tubers are flat-oval, somewhat resembling Up-to-Date. The skin is white.

UP-TO-DATE—A good general purpose potato. The tubers are of good size and shapely with shallow eyes and white skin. Does very well in the cool moist districts and is also a favorite with market gardeners in Sydney and similar climates for their supplies of "new potatoes"

CORONATION—A fine main crop variety, very suitable for the cooler districts of New South Wales. In appearance it somewhat resembles the Early Manhattan, having a rough mottled blue skin. It is flat-oval in shape has very shallow eyes. A heavy cropper excellent keeper.

GUYRA BLUE SKIN—A strain of, and practically identical with Coronation. A fine long season sort.

QUEEN OF THE VALLEY—A Red Skin Variety, producing heavy crops. A splendid table sort with fine flavor but supplies difficult to obtain.

CIRCULAR HEADS—We have discontinued listing this as it is a variety not generally suitable for N.S.W.

CUSTOMERS, NOTE!

PRICES—Owing to Fluctuations in Market Value of Potatoes, we reserve the right to vary prices without notice. We can quote definitely by return of mail for any lines required. Customers when asking for quote, should mention quantity required and when they wish them supplied. **We Quote Special Prices for Ton Lots.** To assist planters, we will, if sold out of variety ordered, substitute variety nearest to it in season and type, which we consider will give satisfactory results. If customers do not desire this, please instruct "Do not substitute."

NOTE—In connection with interstate orders we can only supply on the understanding that our responsibility ceases when a clean certificate has been obtained from the Department of Agriculture, Sydney. Customers in other States, when ordering Seed Potatoes, are requested to advise us that they agree to this condition.

TERMS—The prices of all Seed Potatoes are Nett Cash.

DELIVERY—We Deliver Free on Rail or Steamer, Sydney, after which they are at the risk of the purchaser.

Delivery within the Suburban Area of Sydney is charged extra at the following rate: 6d per 14lbs., 9d. per 28lbs., 1s per 56 lbs., 2s per cwt.

ALL SALES ARE MADE ON THE CONDITIONS OF SALE and NON-WARRANTY as set out in all our invoices and catalogues.

Market Garden Crops

FOR SPRING, SUMMER AND AUTUMN PLANTING

IN districts within reasonable distance of the centres of population and with a fair average rainfall, it is often well worth while for the farmer to reserve some of his best land for vegetable production for market.

The essentials for successful market gardening are good soil, good rainfall or facilities for irrigation, rotation of crops, intelligent use of fertilisers and regular cultivation.

Few crops average out as well as Cauliflower, Cabbage, Pea, Bean, Swede, etc., if grown under suitable conditions. It will be found that the man who, having decided what crops are best suited for his conditions, consistently grows those crops on a well thought out rotation, does better than the grower who is constantly changing over and thereby often meeting a "glut" of the particular line he is growing.

For best varieties, time to plant and for cultural directions, farmers should be guided by local experience and the information given in Yates' Annual and Yates' Garden Guide (1/- post free).

The higher returns regularly obtained by experienced men are evidence that skill and care are very necessary in this branch of farming. Where conditions of soil and season are not favourable, and where varieties have been sown unsuitable to the time of planting or the district, the crop is likely to vary considerably in type, season of maturing and uniformity. Our advice is to grow those varieties your neighbours have proved to do well, and then make your own experiments in a small way as to the suitability of later introductions and improved sorts.

Attention is directed to the Conditions of Sale and Non-Warranty set out on inside of Front Cover and on all invoices.

BEANS

For the warmer districts round Sydney and on the North Coast, beans are the prevailing market crop and in those districts where early crops are possible very handsome returns are being obtained. The same remarks as to the desirability of growing this crop apply as they do to peas. As to varieties, Canadian Wonder is the standard sort, but there are inferior strains offering. **YATES' SELECTED CANADIAN WONDER** are the prime samples offering of a heavy cropping type. No better bean for market growing is offered. Usually 2 bus. per acre is a good sowing and we advise sowing in drills far enough apart to permit of frequent horse cultivation in the early stages of the crop. Prices on application.

CAULIFLOWERS

These are somewhat uncertain, but where success is attained the profits are usually exceedingly satisfactory. The main thing is to grow them in good rich soil and rush them on quickly.

In dry weather they should be well watered especially just after planting out.

Plant in December, January or February, this will generally give the best results.

Sow $\frac{1}{2}$ lb. of seed for every acre of plants required. Varieties suitable include our two Specialities: **Yates' Phenominal Early** and **Yates' Phenominal Maincrop**, which have done exceedingly well since introduced; **Early Italian Giant**, **Veitch's Autumn Giant**, **Late Italian Giant** and **Late Metropole**, which are self-protecting varieties, coming in from five to eight months in the order listed; and **Early Short Stemmed Eclipse** and **Late Eclipse**, which are excellent market sorts of the open or Dutch type.

CABBAGES

Cabbages do best on rich deeply worked soil and are largely grown on the cooler upland country near Sydney. The main planting should be made in December, January and February in most districts. Raise the plants in seed beds transplanting out into rows when large enough to handle, 24 to 30 inches apart each way. About $\frac{1}{2}$ lb. of seed is required to raise plants for one acre. The two leading sorts are:—

YATES' EARLY DRUMHEAD—One of the finest market cabbages grown. There is no better variety for standing the hot summers. The heads are large and solid and in good seasons it matures in four months. We offer Yates' Specially Selected Strain grown on our own Seed Farm. This strain has given great satisfaction. We also stock European grown seed.

HENDERSON'S SUCCESSION—This and Yates' Early Drumhead are the two main cabbages used by market growers throughout Australia. It is a week or two earlier than Drumhead, otherwise very similar. A good carrier and the best and longest standing cabbage for autumn planting for spring use. Our speciality is Yates' Re-selected Strain specially grown on our Tasmanian Seed Farm, and of this seed we have received many complimentary reports. We can also supply European and American grown seed if desired. Other sorts likely to be of interest and worth trying in certain districts are:—**Yates' Vanguard**, **Yates' Utility**, **Copenhagen Market**, which are all of the early, solid, round head type; **Winningstadt**, a pointed cabbage but a sure header and good carrier, and in great favor in California; and **Allhead** and **Surehead**.

Market Garden Crops (Continued)

CUCUMBERS

Cucumbers are a paying proposition to many small farmers in moist, mild districts. The seed must be sown in the Spring when all danger of frost is over, in hills about four feet apart each way. The soil must be in good condition and be liberally manured, and to produce fruit of true character the plants must not be checked in any way. About $\frac{1}{2}$ lb. of seed is sufficient per acre.

For the Sydney market **Improved White Spine** is undoubtedly the best to grow, it is of medium length, thick and solid. **Long Green Prickly** is another good market sort.

MELONS

There is always a demand for well grown stuff, and this applies particularly to the Rock Melon, which is such a favorite fruit. Both Water Melons and Rock Melons (including the Cassabas or Winter Keeping Rock Melon) can only be sown in the Spring when the ground is warm. Light rich well manured soil and plenty of warmth and moisture will produce splendid crops.

The varieties most in demand for market use are **Rocky Ford** (especially the new Gold Lined Strain). **Paul Rose** and **Early Hackensack** in the Rock Melons, and **Kleckley Sweets**, **Cuban Queen**, **Tom Watson** and **Dixie** in the Water Melons. For descriptions see Yates' Annual.

ONIONS

Onions do best in rich adhesive loamy soil which should be deeply worked. This is a crop which usually gives splendid returns as shown by the high prices fetched by good onion land. We have dealt more fully with the growing of onions in our Onion Booklet, which we will gladly post to anyone interested, gratis and post free.

For the warmer districts of N.S.W. and for Queensland, **Yates' Hunter River Early Brown Spanish** is undoubtedly the finest variety. It will give a heavy crop of bulbs when the late varieties fail absolutely. Other very early sorts are **Yates' Light Skinned Spanish** and **Extra Early Golden Globe**, both splendid varieties.

For main crop in a suitable onion district, there is only one variety, and the world over there is no finer market onion offered. We refer of course to **Yates' Select Long Keeping Derwent Strain of Brown Spanish**. It is in great favor throughout Australia and the United States. About 3 lbs. of seed are required per acre.

PEAS

In the Highland districts around Sydney and on the Tablelands, many farmers now devote a portion of their holding to the growing of green peas for the Sydney market, and in recent years this has proved very profitable. The growing of peas or beans for the vegetable market is excellent practice from a rotation point of view; it rests the land from ordinary farm crops, gives it the advantage of a leguminous crop, and leaves the land in an improved condition for succeeding crops. A fair quality of land and a reasonable use of suitable manure are advisable for best results. **YATES' SELECTED N.Z. Grown YORKSHIRE HERO PEAS** is the best main crop variety, but there are also now other sorts largely grown such as **Yates' Utility**, **Little Marvel**, **William Wonder**, **William Hurst**, **American Wonder**, **Richard Seddon**, **English Wonder**, and **Greenfeast**, and we shall be pleased to quote on application. Usually 2 bus. per acre is a good sowing and we advise sowing in drills far enough apart to permit frequent horse cultivation in the early stages of the crop. Unfortunately owing to weather conditions this year's harvest was extremely poor and some sorts are now sold out.

PUMPKINS

The best table varieties are **Yates' Triamble**, a distinctive three cornered variety with very thick flesh; **Yates' Large Button** or **Ironbark**, **Yates' Sydney Crown**. Sow at the rate of 2 lbs. per acre during late spring in hills about eight feet apart each way.

TOMATOES

Tomatoes are now grown very extensively and are yielding very good returns to those marketing clean, sound, well graded fruit.

For instructions and general information regarding Tomato culture for market, we would refer readers to our Tomato booklet (post free on application). This year we are offering varieties claimed to have more or less resistance to the wilt disease, and we believe that it is through this quality of "resistance" when more fully developed that the wilt disease will be overcome. In the meantime we suggest these varieties be tried out under growers' local conditions, and that the market crops, especially the early planted areas, be sprayed every fortnight with Lime Sulphur or Bordeaux Mixture.

The useful varieties for market are **Yates' Harbinger Earliana**, **Chalk's Early Jewel**, and **Yates' Market Favorite** for early crop, and **Burwood Prize**, **Targinnie Blue**, **Matchless** and **Large Smooth Red Stone** for main and late crop.

The different varieties only show their true character under favourable conditions, 2 ounces should raise sufficient plants for one acre. See Yates' Annual for descriptions.

TURNIPS

The garden turnips such as **White Stone**, **Nepaul** are usually grown by the intensive market grower near the city, but the **Swede Turnip** is essentially a farmer's crop, and the Sydney market supplies come largely from the highlands of N.S.W. Sowings at the rate of 2 to 3 lbs. per acre should be made in February, March and April, in drills about 2 ft. 6 in. apart. The best variety is **Yates' Champion Purple Top** a standard globe shaped sort in regular demand in the markets. **Yates' Monarch** is another good sort.

For Prices and Descriptions

See **YATES' ANNUAL**

13/6/24.

Mr. A. F. C. — Dubbo.

I might mention that from **Chalk's Early Jewel** Tomato Seed I grew a phenomenal crop and was able to supply four towns with Tomatoes from 1000 bushes, notwithstanding the fact that there was a heavy drought. I give your reliable Seeds and your book "Tomato Growing for Profit" the credit for this.

Mr. B. V. C. —

Bedfordale, Western Australia.

Pleased to say that the last Drumhead Cabbage was very good; they were a splendid lot, plenty of them weighing 10lbs. and look well. I have cut just about all of them for market.

Mr. W. R. C. —

Alstonville, R.R.

During the past eight months I have grown, with great success, your **Red Stone** Tomato. It is a heavy and continual cropper, and I can thoroughly recommend this variety to growers on the North Coast.

PRICE LIST

OF

SPRAYING PREPARATIONS

As many of these preparations are poisonous they should be kept away from children and domestic animals.

"RELIABLE" ARSENATE OF LEAD.—For all chewing or leaf eating insects, such as pumpkin beetle, codlin moth, grubs, caterpillars etc.

IN PASTE FORM (1 lb making up to 30 gals. spray),
in tins, 1 lb., 2s. 6d ; 2 lb., 4s. 6d.

IN POWDER FORM (1 lb. making up to 50 gals. spray),
 $\frac{1}{4}$ lb., 1s.; 1 lb., 3s. 6d.

"RELIABLE" LIME SULPHUR SOLUTION.—For all fungus diseases such as black spot, mildew, rust etc., (1 gal. makes 10-40 gal. spray, according to purpose required). Per quart, 1s. 6d.; 1 gal., 3s. 6d.; 4 gal. or over, 2s. per gal. (drums 5s. extra returnable); 42 gal. casks, 1s. 9d. per gal. (casks 7s. 6d. extra, returnable).

"RELIABLE" BORDEAUX MIXTURE—For Irish Blight on potatoes and similar tomato diseases, (1 lb. makes up to 10 gal. according to purpose required).

POWDER—per $\frac{1}{4}$ lb., 9d.; per 1 lb., 2s.; over 10 lbs., per lb., 1s. 9d.

BLIGHTY MIXTURE—For spraying potatoes, grape vines, and tomatoes (1 lb. makes up to 6 gals).

POWDER—1 lb., 1s. 9d.; 7lbs., 10s. 6d.; 20 lbs., 27s. 6d. Special prices for large quantities.

HARBAS—For scale, woolly aphis, etc., on fruit trees (1 lb. makes 20 to 30 gal. spray). Per 1 pint, 1s. 6d.; 1 quart, 2s. 3d.; $\frac{1}{2}$ gal., 3s. 6d.; 1 gal. 6s.; 2 gal. 11s.; 4 gal. or over 4s. 6d. per gal. (drums 5s. extra, returnable); 42 gal. casks, 3s. 9d. per gal. (casks 7s. 6d. extra returnable).

PREPARED RED OIL—For scale, woolly aphis, etc., on fruit trees, (1 gal. makes up to 40 or 50 gals. spray, according to purpose required). Per pint 1s., 9d.; 1 quart, 2s. 6d.; $\frac{1}{2}$ gal., 4s.; 1 gal. 7s.; 2 gal. 13s.; 4 gal. or over, 5s. 3d. gal. (drums 5s. extra, returnable); 42 gal. casks, 4s. 9d. per gal. (casks 7s. 6d. extra, returnable).

BENZOLE EMULSION (in paste form)—For thrip, aphis and Rutherglen Fly, 1 lb. makes 5 gal. spray, per 1 lb. tins, 1s. 9d.

NICOTEEN EFFECTO—For aphis, green fly, etc. Per bottle, to make 6 gal., 1s. 6d.; to make 12 gal., 2s. 6d.; to make 24 gal., 4s.; to make 48 gal., 7s. 6d.

BLACK LEAF 40—For aphis green fly, etc.. Per bottle, to make 8 gal., 1s. 9d.; to make 16 gal., 3s.; to make 32 gal., 5s.; to make 64 gal., 9s.; to make 128 gal., 16s.

Follow the instructions when mixing sprays, as the right strength in many cases varies with the season of the year, and with the crop to be sprayed. Mix thoroughly when preparing for use, and keep fluid agitated to preserve uniform strength.

SPRAY PUMPS

SYRINGES

ATOMIZERS, Etc.

Select a good Pump, and after each use pass clean water through it to keep the valves and working parts in good order.

THE CRESCENT SPRAY PUMP—For use with bucket or kerosene tin (Success pattern). For private gardens or very small orchards, this is a very good pump. It has a foot adjustment, so that it can be used with an ordinary bucket, which by the way should be of wood if solutions of copper are used. It is all brass, with ball valves, and is well made. It is fitted with three feet of half-inch delivery hose and a patent Bordeaux nozzle, which will deliver the water either in a solid stream or a coarse or fine spray. Price with 5-ft. hose, 30s. Postage extra N.S.W., 2s. 3d.; other States, 4s. 2d.

For prices of extensions, etc., see below.

THE MYSTO KNAPSACK SPRAYER—(Eclair pattern). These are splendid pumps for general use, well designed and strongly made. They are easily carried on the shoulders. These are used very largely in Great Britain for spraying potatoes for Irish Blight, as well as for fruit trees etc. We can thoroughly recommend them, especially for spraying Bordeaux Mixture. The tank is made of copper, and there is a good agitator. Pump is fitted with a double Vermorel nozzle. Price £5 7s. 6d., freight extra.

BARREL PUMPS—Those wanting spraying outfits for large orchards, etc., are invited to submit particulars of their requirements, when we shall be pleased to send prices, etc., of suitable apparatus.

PUMP SUNDRIES—

Lance Extension	...	...	brass 2 ft.,	7s. 6d.
Bent Brass Extensions (6 in. elbows)	...	...		2s.
Taps for Extensions	...	...		4s. 6d.
"Blind" Caps for Vermorel type nozzles,	...	...		
permitting one to be closed	...	...		1s.

HOSE FOR SPRAY PUMPS—Strong well made hose for "Crescent" and "Mysto" and other similar pumps, per foot 1s. 3d.

ATOMIZERS—Cheap and efficient implements, producing a very fine misty spray. In Brass 8s. 6d., in tin 3s. 6d

SYRINGES—In Brass, with rose and jet, 14 x $1\frac{1}{4}$, 8s. to 10s.; 16 x $1\frac{1}{2}$, 9s. to 14s. 6d.; 18 x $1\frac{1}{2}$, 10s. to 16s.

NOZZLES—

BORDEAUX —One of the most generally useful					
made	...	...	...	...	6s. 6d.
MYSTO (Vermorel type) double swivel	...	...	...	...	7s. 6d.
hose nozzle complete	...	...	...	...	4s. 0d.
GEM hose nozzle	...	...	...	...	3s. 0d.

Spray consistently. It is easier to prevent diseases or to combat them at an early stage than to deal with them when serious and widespread.

Broadcast Seed Sowers

For sowing broadcast Lucerne, Clovers, Sudan Grass, Millets, Pasture Grasses, etc., and small areas of Seed Grain, these machines are excellent. We use them on our own farms for sowing Lucerne, Clovers, etc., and we find them of considerable value.

CAHOON BROADCAST SEED SOWER.

A strong well-made machine capable of giving long and satisfactory service. Having filled machine and set gauge as per instructions, commence walking at ordinary pace, giving handle one complete turn each step. This will give a fine even sowing. Price, 40s.

CYCLONE BROADCAST SEED SOWER.

A neat simple machine which has proved very satisfactory in service. The seed is distributed horizontally, the power being obtained by a cranked handle very conveniently placed. Price, 30s.

COLUMBIA BROADCAST SEED SOWER.

Practical, neat, and mechanically correct in construction. Distributes seed evenly and has an automatic cut off. Accurate measuring device. Price, 27s. 6d.

FIDDLE SOWING MACHINE.

In this machine the action is obtained by a cross motion backwards and forwards which is preferred by some, Price on application.



Caheen Broadcast Seed Sower.

Yates' Manures and Fertilisers.

Heavy and continuous farm crops and good quality flowers and vegetables cannot be grown without manure. Manuring comes next in importance to physical condition of soil, which in turn is dependent on proper drainage, preparation and cultivation of land.

Ordinarily there is nothing to equal stable or farmyard manure, but for farm use it is impossible to obtain in Australia in required quantities. Artificial manures however have a very great value, especially if the humus content of the soil is kept up by crop rotation and green manuring. For general purposes superphosphate is an excellent fertiliser, but the following special manures are superior for their respective crops.

For bag lots or over write for Quotations.

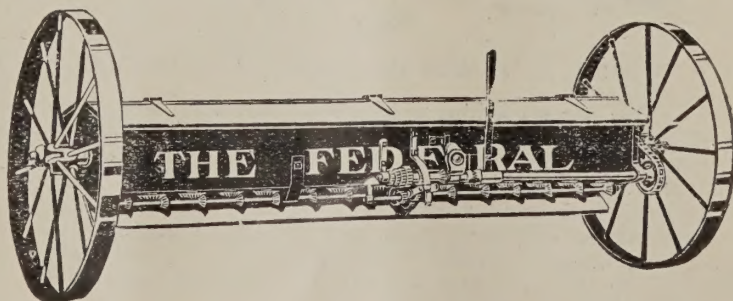
Manures.	Ton	Cwt.	56-lbs.	28-lbs.	14-lbs.	7-lbs.		
							s.	d.
Superphosphate	£ 6	7	4	2	1	0	0	9
Bonedust	10	11	5	3	1	0	1	0
Blood and Bone	10	11	5	3	1	0	1	0
Sulphate of Ammonia	20	22	11	5	3	2	2	0
Sulphate of Potash	20	22	11	5	3	2	2	0
Nitrate of Soda	...	25	13	7	4	2	2	0
Yates' Plant Food	...	17	8	4	2	1	3	6
A.Y. Sweet Pea Manure	...	16	8	4	2	1	3	6
A.Y. Flowers and Shrubs Manure	...	16	8	4	2	1	3	6
A.Y. Potato and Tomato Manure	...	16	8	4	2	1	3	6
A.Y. Cabbage and Cauliflower Manure	...	16	8	4	2	1	3	6
A.Y. Onion Manure	...	15	8	4	2	1	3	3
A.Y. Pea and Bean Manure	...	12	6	3	2	0	1	3
A.Y. Pumpkin and Melon Manure	...	15	8	4	2	1	3	3
A.Y. Lucerne and Clover Manure	...	12	6	3	2	0	1	3
A.Y. Maize and Green Fodder Manure	...	15	8	4	2	1	3	3
A.Y. Maize (for Grain) Manure	...	13	7	3	2	0	1	3
A.Y. Stone Fruit & Strawberry Manure	...	15	8	4	2	1	3	3
A.Y. Citrus, Passion & Grape Manure	...	16	8	4	2	1	3	3
A.Y. Special Lawn Manure	...	16	8	4	2	1	3	3
A.Y. Rape and Root Crop Manure	...	13	7	3	2	0	1	3
A.Y. Hay and Pasture Manure	...	13	7	3	2	0	1	3
C.P.C. Powdered Carbonate of Lime	...	...	...	...	...	...	...	...

5s. 6d. per bag

Prices on Application.

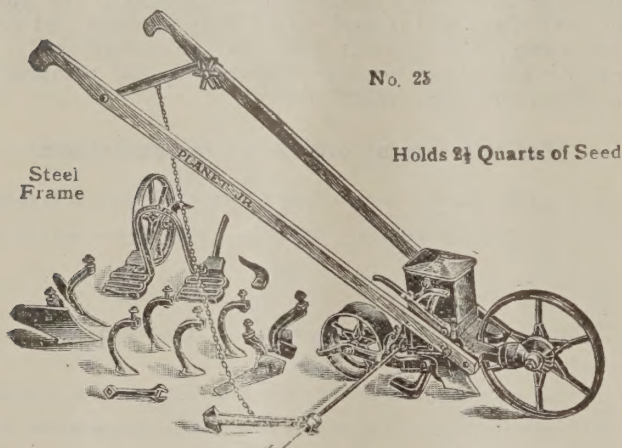
The "Federal" Lime and Fertiliser Spreader.

For enriching pasture lands and cropping areas Well and strongly made in 6ft. 9ft. and 12ft sizes, the 9ft. being the standard size. All particulars on application.



Planet Jr. Implements

THE intelligent use of these wonderful labor saving implements is a big factor in the successful working of market gardens, orchards, etc. Provided reliable seeds only are sown, regular and accurate planting, followed by consistent cultivation, will do more than anything else to ensure big returns. We therefore offer the following machines with every confidence. They are the strongest and most useful on the market, and have an excellent reputation for design and durability.

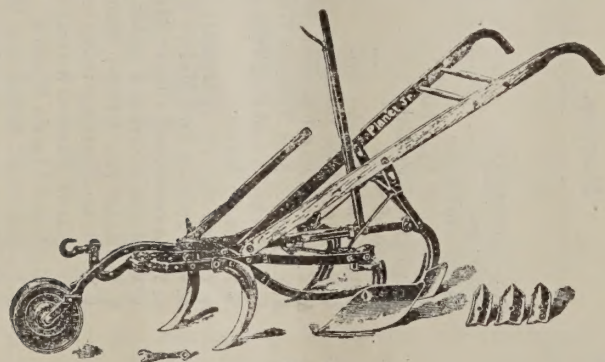


The Combined Hill and Drill Seeder, Double and Single Wheel Hoe, Cultivator and Plow. A most useful tool for all large Gardens. All particulars on application.

PLANET JR. COMBINED HILL AND DRILL SEEDER, DOUBLE AND SINGLE WHEEL HOE CULTIVATOR AND PLOUGH.

An excellent hand machine for either garden or farm. As its name indicates, it is a well designed tool, combining the functions of an efficient seeder for sowing in drills and in hills, a double wheel and a single wheel hoe, a cultivator and garden plough. It will sow almost all varieties of seeds, and this together with its many other uses makes it one of the most useful tools one can have.

Price on Rail or Steamer Sydney Weight,
packed, about 60 lbs. £6 15 0



No. 8

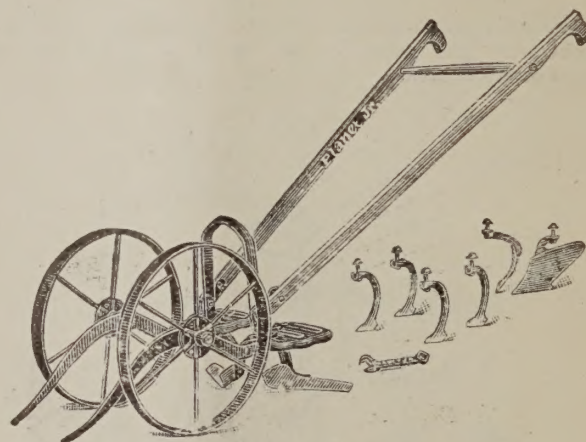
PLANET JR. HORSE HOE AND CULTIVATOR

This horse machine is a general favorite, being complete and easily operated. Believing as we do that the more thorough the cultivation, the more sure the crop, we would like to see at least one of these implements in use on every farm and large market garden. This machine is made almost entirely of steel, well braced and adaptable to any conditions. Frame of stiff steel, extra long and high, closes to 10 inches and opens to 25. Handles adjustable up, down and sidewise.

Cultivator teeth are of high carbon bevelled steel, thereby making them self-sharpening, and the point retain its shape, greatly prolonging the life of the steel. Patent hillers are reversible for hoeing or hilling. Can be run close to the plants without endangering the roots.

We would draw special attention to the depth regulator which operates with the wheel lever. It is an important particular. It controls the depth and steadies the machine, and is adjusted in an instant. The solid steel wheel, having no spokes, does not clog with sticks, stones, or trash.

Price on Rail or Steamer Sydney. Weight,
packed, about 84 lbs. £6 0 0



No. 12

PLANET JR. COMBINED DOUBLE AND SINGLE WHEEL HOE, CULTIVATOR AND PLOUGH

A double and single wheel hoe in one, with high arch, so that crops can be straddled until 20 inches high—ensuring quicker and cleaner work. It may then be used between the rows with one or two wheels. Will do almost any kind of garden work—ploughing, harrowing, hoeing, cultivating, opening furrows, covering and hilling, and useful throughout the season. Tools are of special design and specially hardened, giving great satisfaction and long service. The hoes are the most useful attachment and wonderful weed killers. All steel cultivator teeth for deep or shallow work, reversible ploughs for opening or closing furrows, and leaf lifters for late cultivation.

To work effectively the ground must be in a good loose and friable condition. In heavy and badly worked land the use of this implement is not satisfactory.

Price on Rail or Steamer Sydney. Weight,
packed, about 33 lbs. £3 10 0

Yates

CURRENT PRICE LIST

of Recleaned and Tested FARM SEEDS

CONDITIONS OF SALE AND NON-WARRANTY

We believe that all Seeds, Bulbs, and Roots sold by us are of the description and kind specified by us at the time of sale, but owing to the practical impossibility in many cases of being certain of this, we give no undertaking that such Seeds Bulbs or Roots will correspond with the description under which they are sold, and we make all sales subject to this condition. We further give no warranty, expressed or implied, as to their growth, description, quality or productiveness, and will not be in any way responsible for the crop. If the purchaser does not accept the goods sold to him on these terms, they are at once to be returned to us, and any money paid to us will be refunded.

ARTHUR YATES & CO. LTD.

ARTHUR YATES & CO. LTD.
184 & 186 SUSSEX ST SYDNEY

POSTAL ADDRESS, 2707 G.P.O.
TELEGRAMS, SEEDSMAN SYDNEY

APPROXIMATE QUANTITIES TO SOW PER ACRE And Weight in lbs. of varieties quoted per bushel

Farm Seeds

	Sow per acre if used alone
Danthonia	15 lb.
Mitchell Grass	2 to 3 lb.
Rhodes Grass	4 to 6 lb.
Paspalum Dilatatum	10 lb.
Paspalum Compressum	5 lb.
Couch Grass	10 lb.
Tall Oat Grass	25 to 30 lb.
Phalaris Bulbosa	8 to 10 lb.
Kikuya Grass	2500 roots
Cocksfoot, 20 lb. bus.	1½ bus.
Prairie Grass, 20 lb. bus.	2 bus.
Awnless Brome Grass	35 lb.
Rye Grasses, 20 lb. bus.	2 bus.
Mixed Grasses, 20 lbs. bus.	1½ to 2 bus.
Grasses and Clovers, Mixed	30 to 40 lb.
Clovers. sown alone	12 to 15 lb.
" sown with grasses	2 to 3 lb.
Subterranean Clover	4 to 6 lb.
Strawberry Clover	from 1 lb.
Lucerne, moist localities, broadcast	15 to 20 lb.
Lucerne, moist localities, drilled	10 to 12 lb.
Lucerne, dry districts	6 to 10 lb.
Cow Peas, drilled	10 lb.
" 60 lb. bus., broadcast	½ to 1 bus.

	Sow per acre if used alone
Soy Beans, drilled	15 lb.
" 60 lb. bus. broadcast	1 bus.
Velvet Beans, in wide drills	15 lb.
Market Beans, 60 lb. bus.	2 bus.
Peanuts	nuts 30 to 40 lb. shelled seed 10 lb.
Field Peas, 60 lb. bus.	2 bus.
Lupins, 60 lb. bus.	2 bus.
Tares or Vetches, 60 lb. bus.	1 to 2 bus.
Horse or Tick Beans, 60 lb. bus.	2 bus.
Maize, in rows for grain	8 to 12 lb.
Maize, 56 lb. bus., broadcast	1 to 1½ bus.
Sorghum, Broadcast	20 to 30 lb.
" in drills	10 lb.
Grain Sorghum	4 to 6 lb.
Millet, broadcast	20 lb.
" in drills	10 lb.
Sudan Grass	8 to 12 lb.
Seed Oats, 40 lb. bus.	2 bus.
Seed Wheat, 60 lb. bus., in drills for grain	¾ to 1 bus.
Seed Wheat, broadcast	1 to 2 bus.
Barley, 50 lb. bus.	2 bus.
Rye Corn, 60 lb. bus.	2 bus.
Sowing Rape	3 to 6 lb.
Sheeps Burnet	10 to 12 lb.
Sunflower, in rows	12 lb.
Artichokes	4 to 6 cwt.

	Sow per acre if used alone
Buckwheat, 50 lb. bus., broadcast	1 bus.
" in drills	25 lb.
Canary Seed	17 to 20 lb.
Linseed	60 lb.
Cattle Melon	2 lb.
Cattle Pumpkin	1 to 2 lb.
Mustard	8 lb.
Silver Beet	4 lb.
Mangolds	5 lb.
Sugar Beet	8 lb.
Field Carrot	3 lb.
Swede Turnips	2 to 3 lb.
Potatoes	6 to 8 cwt.

Market Garden Crops

Garden Beans, 60 lb. bus.	2 bus.
Cabbage	½ lb.
Cauliflower	½ lb.
Cucumber	½ lb.
Melon, Water	2 lb.
" Rock	½ lb.
Onion	3 lb.
Peas, 60 lb. bus.	2 bus.
Pumpkin	2 lb.
Tomatoes	2 oz.
Turnip	2 to 3 lb.

LUCERNE.

Yates' A.Y. Broadleaf Giant Upright—This is the proved best strain for all purposes and Australian conditions. For full information see Yates' Lucerne Booklet. Supplied only in sealed and branded bags

25 lbs. 2/7 lb.; 50 lbs 2/6 lb.

Small lots under 25 lbs. ...	2/9 lb.
25 lbs. and over ...	2/7 lb.
5 cwt. and over ...	2/6 lb.
10 cwt. and over ...	2/5 lb.

LUGUMINOUS CROPS.

(OTHER THAN CLOVER AND LUCERNE)

Market Beans—See Market Garden Crops

Cow Peas—Black Seeded ...	25/-	bus.
„ „ Clay Coloured ...	*	bus.
Soy Beans—Early Black ...	1/3	lb.
Velvet Beans—Speckled ...		

Osceola } To arrive ... 1/3 lb.
Bunch }

Market Peas—See Market Garden Crops

Peanuts—Large White Chinese ...	1/6	lb.
„ „ over 14 lbs ...	1/4	lb.
„ „ Red Spanish ...	1/3	lb.
„ „ over 14 lbs ...	1/1	lb.

Field Peas—(Prime Seed Samples)

Grey or Partridge ...	10/6	bus.
Blue ...	11/6	bus.
Dun ...	10/6	bus.
Lupin, Annual Blue ...	17/6	bus.
Tares or Vetches—Golden ...	19/6	bus.
English Grey ...	17/-	bus.
Large Scotch Grey ...	19/6	bus.
Horse or Tick Beans ...	14/9	bus.
Kudzu Vine (in packets only) ...	1/-	pkt.

SEED MAIZE

SELECTED AND REGRADED SAMPLES

Stocks are not all in store yet, but we expect to supply at following Prices.

Early Morn ...	17/6	bus.
Ninety Day (Victorian) ...	10/6	bus.
Small Early Leaming ...	7/6	bus.
Small Early Red Hogan ...	7/6	bus.
Silvermine (to arrive) ...	9/9	bus.
Funk's Early Yellow Dent (to arrive) ...	10/6	bus.
Wellingrove (or Early Yellow Dent) ...	7/6	bus.
Hickory King, for Fodder ...	7/6	bus.
„ „ for Grain ...	9/9	bus.
Giant White ...	7/6	bus.
Manning White (to arrive) ...	9/9	bus.
Selected Yellow Moruya ...	9/9	bus.
Goldmine ...	9/9	bus.
Large Red Hogan ...	8/-	bus.
Yellow Hogan ...	7/6	bus.
Yellow Horse Tooth ...	*	bus.
White Horse Tooth ...	*	bus.
Yellow Hawkesbury ...	7/6	bus.
Fitzroy (or Improved Yellow Dent) ...	9/9	bus.

SUDAN GRASS

The Great Summer Fodder Crop

Our samples are specially selected and thoroughly Re-machined.

Small lots under 28 lbs. ...	6d.	lb.
28 lbs. and over ...	5½d.	lb.
56 lbs. and over ...	42/-	cwt.
5 cwt. and over ...	39/-	cwt.
10 cwt. and over ...	36/-	cwt.

SORGHUM

Selected Seed Samples and Mostly Cool Country Grown

Black Sorghum (Saccharatum) ...	57/6	cwt.	7d	lb.
Ambercane ...	55/-	cwt.	7d	lb.
Planters Friend ...	36/-	cwt.	4½d	lb.
Saccaline ...	40/-	cwt.	5d	lb.

GRAIN SORGHUM

White Yolo ...	1/-	lb.
Feterita ...	10d	lb.
Milo ...	10d	lb.

MILLET

Japanese ...	22/6	cwt.	3½d	lb.
White French ...	36/-	cwt.	4½d	lb.
Hungarian ...	22/6	cwt.	3½d	lb.
Siberian ...	*	lb.		
Broom ...	6d	lb.		

SEED OATS.

Algerian—Yates' A.Y. Ex. Prime Re-mach. ...	5/11	bus.
56 bus. and over ...	5/10	bus.
Good Re-cleaned ...	5/9	bus.
56 bus. and over ...	5/8	bus.
Sunrise A.Y. Re-machined ...	7/3	bus.
56 bus. and over ...	7/2	bus.
Sunrise, Graded for Greenfeed ...	6/8	bus.
56 bus. and over ...	6/7	bus.
Mulga AY Re-machined ...	*	bus.
56 bus. and over ...	*	bus.
Guyra ...	6/6	bus.
Ruakura ...	7/3	bus.
White Tartarian ...	6/6	bus.
Black Tartarian ...	7/3	bus.
Heavy White ...	8/6	bus.
Heavy Black ...	*	bus.
Dun ...	*	bus.

SEED WHEAT.

Re-cleaned Samples from Select Stocks

Florence ...	8/6	bus.
Thew ...	8/6	bus.
Canberra ...	8/-	bus.
Federation ...	8/-	bus.
Hard Federation ...	8/-	bus.
Marshall's No. 3 ...	8/-	bus.
Yandilla King ...	8/-	bus.

SEED BARLEY.

Cape, selected, free of smut ...	6/4	bus.
Skinless ...	10/6	bus.
English ...	7/6	bus.

RYE CORN.

Mammoth White ...	8/6	bus.
Emerald ...	*	bus.

SOWING RAPE.

Yates "AY" Dwarf Broadleaf Essex, 8d. lb.; 60/- cwt.;

SUNDRY FODDER CROPS.

Artichokes (Jerusalem) tubers only ...	15/-	cwt.
Buckwheat, Japanese (50 lbs. bus.) ...	14/-	bus.
Burnet, Sheep's ...	10d	lb.
Canary Seed (for sowing) Queensland grown ...	56/-cwt.	8d. lb.
Large Moroccan grown ...	* cwt.	* lb.
Kale, Thousand Headed ...	2/6	lb.
Kale, Chou Moellier ...	3/6	lb.
Linseed (Flax) ...	6d	lb.
Melons, Mixed Cattle ...	4/-	lb.
Mustard, Agricultural ...	1/2	lb.
Pumpkin, Mammoth Cattle ...	7/-	lb.
Pumpkin, Gramma ...	8/6	lb.
Pumpkin, Mixed Cattle ...	4/-	lb.
Silver Beet, ...	1/6	lb.
over 28 lbs. ...	1/3	lb.
Sunflower, Black Seeded ...	1/6	lb.
over 28 lbs. ...	1/3	lb.
Sunflower, Striped Seeded ...	1/6	lb.
over 28 lbs. ...	1/3	lb.
Old Man Salt Bush (Atriplex nummularia) ...	5/6	lb.
Creeping Salt Bush (Atriplex semibaccata) ...	5/6	lb.
Kurrajong (Sterculia diversifolia) ...	1/6	oz.
Tagosaste (so-called Tree Lucerne) ...	4/6	lb.
Medicago Arborea ...	*	lb.

ROOT CROPS.

Mangold—Yates' Mammoth Long Red, Golden Tankard, Long Yellow, Yellow Globe, Sludstrup ...	2/6	lb.
Giant Half Sugar, White and Rose ...	2/9	lb.
Sugar Beet ...	3/6	lb.
Swedes—Yates' Champion Purple Top ...	2/6	lb.
Yates' Monarch ...	2/6	lb.
Field Turnips—Best Varieties ...	2/6	lb.
Field Carrots—Varieties ...	4/6	lb.

SEED POTATOES

See Special Price List

MARKET GARDEN CROPS.

Peas—Yorkshire Hero, Yates' Selected N.Z. Grown ...	25/-	bus.
Peas—Other Varieties, supplies exceedingly short, apply for Price List ...	*	
Beans—Canadian Wonder Yates' Selected ...	27/-	bus.
Prime Re-cleaned ...	26/-	bus.
Other Vegetable Seeds—See Yates' Annual		

Lines marked * are not at present in stock, but supplies may be available a little later—write us.

ARTHUR YATES & CO. Ltd. 184-188 SUSSEX STREET, SYDNEY

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Yates Recleaned & Tested Farm Seeds

Current Price List

THE PRICES quoted herein are those ruling at this date. Quotations are subject to sales and to market fluctuations. Orders should be accompanied by remittance for the approximate amount of the order, and including freight when goods are required by coastal steamer or by passenger train. Please add exchange to country cheques. Orders sent by goods train are consigned, carriage forward (except to unattached platforms), unless we are otherwise instructed at time of order. We deliver seeds on rail or wharf, Sydney, after which seeds are on customer's account, and at his risk. Grass and Fodder Seeds (except Seed Grain) are invoiced at net weights, and bags charged for. This is to buyer's advantage. Our terms for all Agricultural Seeds are strictly Net Cash. Samples of any lines sent for inspection.

GRASS SEEDS.

NATIVE VARIETIES.

Danthonia (Wallaby Grass)	...	2/3	lb.
Mitchell Grass (Astrebla)	...	10/-	lb.
Australian Blue Grass (Andropogon)	...	*	lb.
Coolah Grass	...	*	lb.
Native Millet	...	*	lb.
Flinders Grass	...	*	lb.

INTRODUCED VARIETIES

Rhodes Grass	...	1/4	lb.
" " 56lbs. and over	...	1/2	lb.
Paspalum Dilatatum—			
Yates Prime hand-shaken	...	1/4	lb.
" " 56lbs. and over	...	1/2	lb.
Paspalum Compressum	...	1/9	lb.
Couch (Cynodon dactylon)	...	2/3	lb.
" " 56lbs. and over	...	2/2	lb.
Tall Oat Grass (Avena elatior)	...	1/8	lb.
" " " " over 28 lb.	...	1/7	lb.
Phalaris Bulbosa	...	*	lb.
Kikuyu Grass (roots only)	5/- per 100; 35/- 1000		
Cocksfoot, Yates Extra Heavy Re-machined	26/-	bus.	
Prairie, Yates Finest Remachined	*	bus.	
Awnless Brome Grass (Bromus inermis)	1/6	lb.	
over 28 lbs.	1/5	lb.	
Rye Grass, Perennial—			
Yates Extra Heavy Poverty Bay	16/6	bus.	
Yates Special Old Pasture	10/9	bus.	
Rye Grass, Italian—			
Yates Heavy Re-machined	10/9	bus.	
Westerwoldicum Re-machined	*	bus.	
Rye Grass, Wimmera	16/6	bus.	
Poa pratensis (Kentucky Blue Grass)	2/-	lb.	
Poa trivialis	2/6	lb.	
Poa nemoralis	2/11	lb.	
Texas Blue Grass (roots only)	7/6	per 100	
Elephant Grass (cuttings only)	7/6	per 100	

Fescue, Tall	...	1/2	lb.
Fescue, Chewings	...	1/5	lb.
Fescue, Meadow	...	1/2	lb.
Agrostis canina (Brown Top)	...	5/-	lb.
Agrostis vulgaris (Red Top)	...	1/6	lb.
Agrostis stolonifera (Creeping Bent or Fiorin)	...	2/-	lb.
Teff Grass	...	1/6	lb.
Timothy	...	1/2	lb.
Meadow Foxtail	...	2/-	lb.
Crested Dogstail	...	1/6	lb.
Yorkshire Fog	...	9d	lb.
Rib Grass, or Lamb's Tongue	...	7d	lb.

CLOVER SEEDS.

White, Yates' AY Superfine	...	2/6	lb.
Wild White (English grown)	...	10/3	lb.
Cow Grass, Yates Superfine, N.Z.	...	1/7	lb.
Perennial Red, Yates N.Z. grown	...	1/7	lb.
Perennial Red, Fine Imported	...	1/6	lb.
Crimson (Trifolium incarnatum)	...	1/-	lb.
Alyske	...	1/2	lb.
Berseem (Egyptian Clover)	...	1/6	lb.
Subterranean Yates' AY	...	7/3	lb.
14 lbs. and over	...	7/-	lb.
Strawberry (Shelled Seed)	...	10/9	lb.
Shearman's Clover (roots only)	...	*	100
English Yellow Trefoil (Medicago lupulina)	...	1/-	lb.
Lotus corniculatus	...	3/-	lb.
Lotus major	...	5/3	lb.
Lotus Angustissimus	...	1/5	lb.
Medicago orbicularis (Burrless Clover)	...	1/6	lb.
Medicago denticulata (Burr or Native Trefoil) Shelled Seed	...	1/-	lb.
Bokhara (Melilotus alba)	...	1/6	lb.
Sainfoin	...	1/6	lb.

[PLEASE TURN OVER]

We send the following Publications on Application :

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The most complete and most popular small manual on Australian Gardening yet published, which comprises one hundred and eighty pages, and has been completely revised 1s. post free

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A small booklet on Onion Growing. Post free

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ARTHUR YATES & CO. LTD.

184-186-188 Sussex Street, ————— SYDNEY, N.S.W.

The Largest Seed Warehouse in Australia



THIS reproduction from a photograph will give some idea of our Sydney Warehouse which is of six stories and provides us with over an acre of floor space.

A great part of this large Building is devoted to the Storage, Re-cleaning and Testing of Agricultural Seeds, which form such a large part of our business.

We have installed and perfected the largest and most complete Seed-cleaning Plant in Australia—this means QUALITY.

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